JANUARY 1934

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Ferrous, non-ferrous materials or their alloys.

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OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

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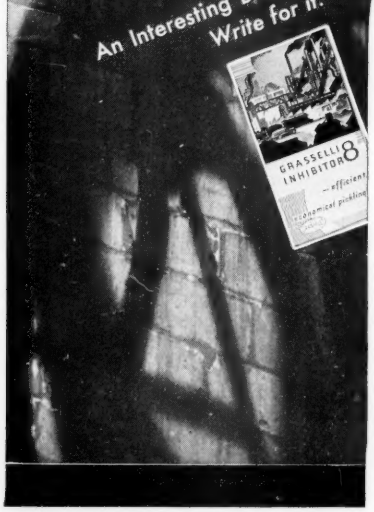
DRAWING AND EXTRUSION DIES - - - ALL TYPES OF CEMENTED CARBIDES

EFFICIENT-ECONOMICAL PICKLING

GRASSELLI 8

INHIBITOR



FIGURES
WHICH MAY INTEREST YOU

These figures, representing regular production over a period of months, have been obtained from different plants in this country and they cover the acid consumption, per ton of material pickled, found in those plants:

	ACID USED °Be.	Pounds
Cold drawn alloy and straight carbon bars, all shapes, ½" round and up	60	18-20
Rod, wire, bolt and nut mill; material equally divided as to grades and sizes, some annealed stock	60	28-30
Rod and wire mill, large tonnage; pickling basic, bessemer, rephosphorized, 65-75 carbon patent anneal rod	60	39-40
Rod and wire mill, fair tonnage; 60% of which is 65-75 carbon patent anneal, balance hot rolled, low carbon No. 5 rod	66	28-30

Representing average mills, average plant and equipment conditions, simple pickling room control and *the use of a good inhibitor*, we believe these figures prove the economy of efficient, economical pickling . . . Would your plant be in this list? If not, Grasselli 8 Liquid Inhibitor and Grasselli Service can be of benefit to you.

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Wanted
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Wanted
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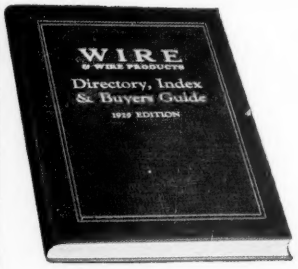

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We give therein production figures based on actual mill conditions. If your machines are not showing equal or better figures, it would be profitable to invest a few cents in postage, and find just how good a Modern Wire machine may be.

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WORCESTER, MASS., U. S. A.

DESIGNERS AND BUILDERS OF HIGH PRODUCTION WIRE MILL EQUIPMENT.

WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip Wire Products and Insulated Wire and Cable.

DRAWING—ROLLING—EXTRUDING—FORMING—FABRICATING

Vol. 9 January 1934 No. 1

Designated as
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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING --- EXTRUDING --- FORMING --- FABRICATING

Vol. 9 | January 1934 | No. 1

Pipe From Hot Skelp

By J. B. Nealey

American Gas Association, New York, N. Y.

A description of the production methods used at the Monaca, Pa. plant of the Pittsburgh Tube Co. in the manufacture of seam welded steel pipe from hot skelp, using gas fired furnaces.

THE original, possibly still the best method of making pipe, is to heat long strips of steel (skelp) and pull them through a bell mouthed die, the smallest end of which is of the same size as the pipe to be made. The hot skelp is curled and forced into a circle as it is pulled through and the edges are forced together in a butt weld.

✦ ✦ ✦

PIPE running from ¼ to 3 in. in diameter is made by this method, the various steps being as follows:

(1) Point and form ends of skelp cold
(2) Heat skelp in gas fired furnace
(3) Pull hot skelp through bell shaped die in draw bench thus forming pipe
(4) Round and size the pipe in rolls and on same heat
(5) Cool in rack
(6) Straighten in askew rolls
(7) Hot saw into proper lengths
(8) Inspect and test under 700-1200 lbs. water pressure

✦ ✦ ✦

THIS way of making seam welded steel pipe is employed by the Pittsburgh Tube Company at its Monaca, Pa., plant. There are two long main buildings, the first joining the second in a sort of Y so that the machines, furnaces, etc. are laid out for progressive straight line production with no backhandling of work. The material is handled through the various steps by giant overhead cranes with hoists running the entire length of both buildings. Railroad spurs serve the skelp yard and both buildings. The skelp yard sets in the angle between the two buildings.

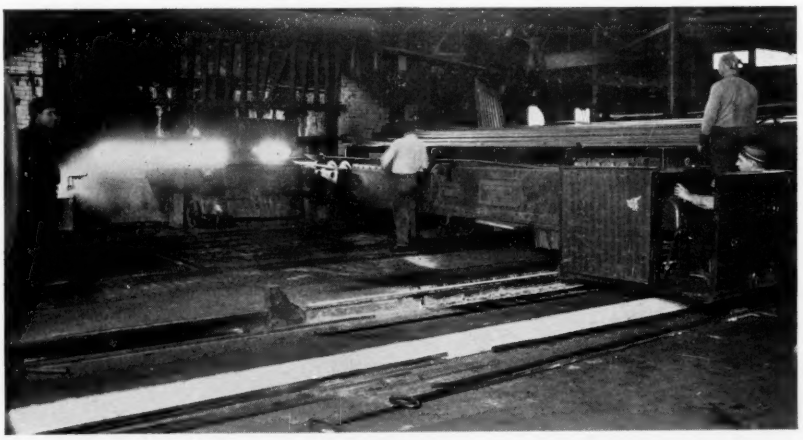

Fig. 1. Charging skelp into regeneration type gas furnace. Hot skelp is withdrawn from opposite side of furnace and pulled into pipe through a die. The draw bench is very similar to the charger shown in this picture.

✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦

✦ ✦ ✦

Furnaces for Pipe Making Units

THERE are two pipe making units with furnaces and the furnace of the first unit is of the regenerative type and 28 ft. square. It has a horizontal slot in both sides and the skelp is charged and discharged through these slots. On one side is a motor driven charger operating back and

forth on a track. First the skelp is dropped by crane onto a shear table where the ends are shaped like a V and then curved. The charger is 25 ft. long and is operated by two men. One puts the 30 ft. skelp, piece by piece, onto rotating magnetic rolls which shoot them into the furnace. The other man operates the charger back and forth so that the skelp is evenly distributed over the furnace hearth.

✦ ✦ ✦

Gas Heating Equipment

HEAT is supplied by means of 32 gas burners, 16 in each side, and as air for combustion is drawn through hot checkers, the burners on each side fire at alternate intervals. Gas is carried along each side of the furnace by a 5 in. manifold and is fed to the burners by 1¼ in. pipes. Temperature control is aided by the use of recording pyrometers. The second furnace is exactly like the one described except that it is smaller (15 x 25 ft.) and fired by only 24 burners.

Draw Bench

ON the opposite side of the furnace from the charger is a 35 ft. draw bench operating back and forth on a track. One operator positions the bench while the other picks up the skelp with tongs and hooks the end in the draw bench where it is drawn through a bell shaped die.

✦ ✦ ✦

Normalizing Furnace

AFTER sizing in the rolls and cooling on the rack some of this pipe is taken out of the regular line of production by transfer rolls and is normalized. This normalizing furnace is continuous in operation, of the walking beam type, and is fired with gas fuel. It is 15 x 25 ft. and equipped with 20 burners. Of these burners, 12 are located on one side close to the roof so that they overfire the work while the remainder are located low down in the opposite side and underfire the work.

THE burners are of the inspirator type, high pressure gas being used to inspirate air for combustion. The furnace temperature is regulated by two automatic potentiometer type recording controllers connected to three-position, motor operated valves, cut into the gas manifold supplying the burners on each side.

✦ ✦ ✦

THE pipes are carried through the furnaces at the proper speed by 7 mechanically operated walking beams which operate through slots in the hearth. The normalized work drops out, on the discharge side, onto skids and is carried through straightening rolls back into the main production line.

✦ ✦ ✦

Galvanizing

IN the second building also are the cold drawing division, inspection, testing, galvanizing, threading, painting, etc., etc., the pipe being transferred to various divisions by crane. The galvanizing division contains four pickle vats, one galvanizing tank and a water vat for cooling. A bundle of

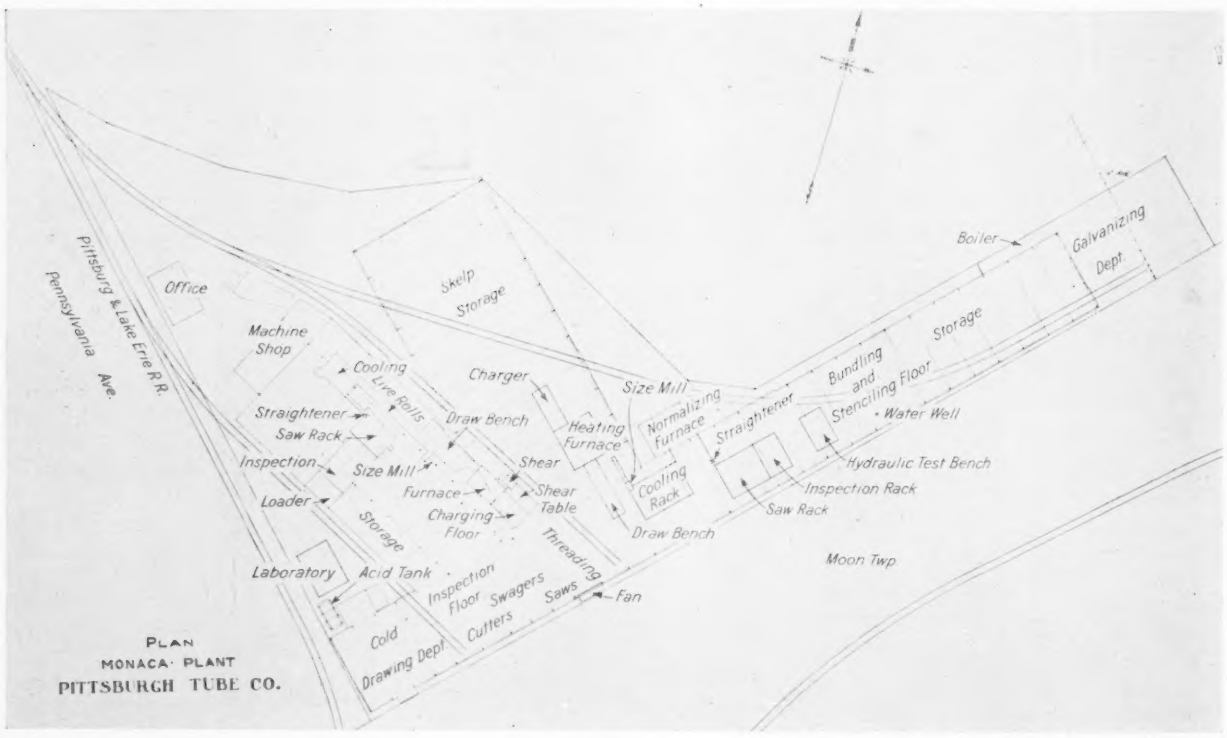

Fig. 2. Plain of Monaca plant—Pittsburgh Tube Co.

✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦

work is placed by crane on a rack and an operator handles the pipes in and out of the molten zinc, one at a time, with hand tongs.

✦ ✦ ✦

TO remove the pipe from the bath he simply pushes the end through a blow ring and touches it to a pair of magnetic rolls. These rolls draw it clear out of the bath over a line of rollers and all excess zinc is blown off as it passes progressively through the ring. This ring is made from special castings perforated on the inside and pressure air is blown through the perforations. Another operator pulls it clear of the rolls, blows steam through to clean the inside and then rolls it down inclined skids into the water tank for cooling. From here it is picked out by crane and passed through straightening rolls.

✦ ✦ ✦

THE galvanizing tank which sets in a brick furnace is 24 ft. long, 4 ft. deep and 42 in. wide. It is fired by 38 gas burners (19 on each side) of the high pressure inspirator type. They fire through tunnels directly onto beds of refractory material so as to produce incandescence. These beds are enclosed in small chambers open at the top and spaced 4½ in. from the pot wall. The heat rises and enters the open space next to the pot wall and is drawn down into a flue below which connects with a stack. In this manner, almost the entire surface of both pot walls is subjected to a very high heat without flame impingements.

✦ ✦ ✦

THE radiation from the refractory beds is to promote complete combustion in the smallest space and shortest time. While the furnace walls facing the kettle or pot radiate considerable heat to the kettle walls, most of the heat input to this tank is by convection. This is due to the fact that the distance between the furnace and kettle walls was designed to provide the greatest velocity for the products of combustion passing through. This method provides material savings in fuel, labor and dross accumulation increases production and tank life and improves the quality of the product.

✦ ✦ ✦

HARDENING and sizing are accomplished by cold working, some of the pipe being redrawn cold. Any mechanical imperfections are detected by drawing the pipe slowly through a magnetic tester which automatically plots a curve on a chart. Fluctuations in this curve denote imperfections and the material is rejected.

✦ ✦ ✦

STEAM used in this plant is made in a gas fired tubular boiler which is automatic and continuous in operation. This eliminates all necessity for an engineer or attendant.

✦ ✦ ✦

IN addition to the engineering department, this concern also has two laboratories, chemical and physical, where all incoming material as well as outgoing work is carefully checked.

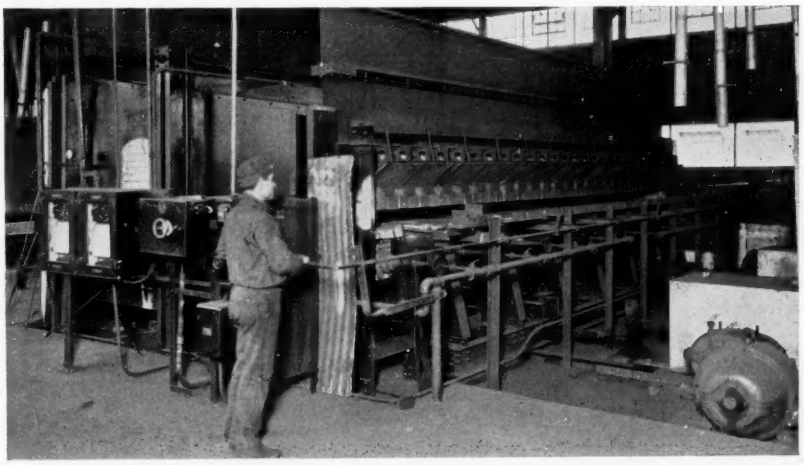

Fig. 3. Charging end of walking beam type of gas-fired normalizing furnace, showing gas burners and temperature controllers and recorders. ✦ ✦ ✦ ✦ ✦ ✦ ✦

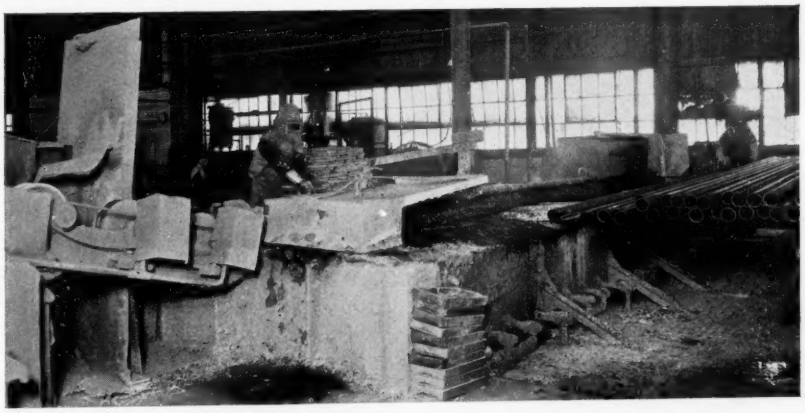

Fig. 4. Gas fired galvanizing furnace of recent design as shown in detail drawing. ✦ ✦

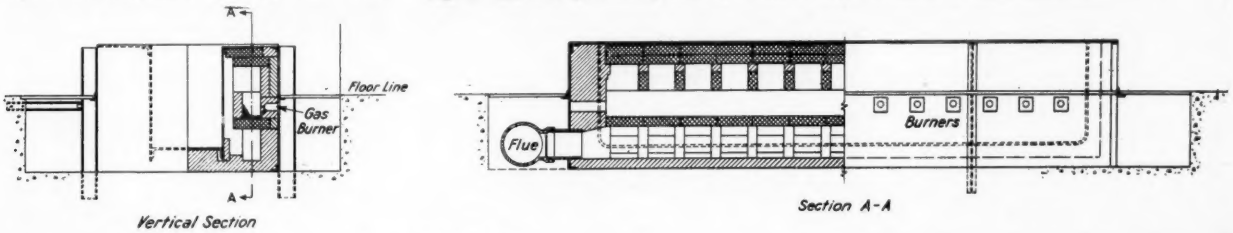

Fig. 5. Detail drawing of galvanizing pot and gas firing system. ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦

"Ingot to Wire"

Basic Open-Hearth Carbon Steel for Cold Heading

By A. B. Arganbright

Superintendent of Inspection and Tests, Wheeling Steel Corp., Portsmouth Works, Portsmouth, O.

THIS paper deals with carbon steel made by the basic open-hearth process for use in cold heading products, ranging from 0.08 to 0.40 per cent carbon and 0.25 to 0.80 per cent manganese. The subject covers a broad field and far greater than can possibly be covered in this paper; nevertheless, before entering into the discussion of ingot making a word should be given on the subject of the quality of the steel.

+ + +

THE better the grade of steel to be produced, the greater becomes the need of more care and attention in its making. High grade steels have made the modern automobiles possible and the fact must not be overlooked that the many bolts and cold-headed parts which go to make up the automobile play just as an important role as any other piece of steel in its assembly. In the making of open-hearth carbon steel for cold-headed products, the raw materials are of prime importance both in the blast furnace and the open-hearth. The hot metal or cold pig charged in the open-hearth must be within a specified analysis and accompanied by carefully selected scrap. Inasmuch as cleanliness is a prime requisite of cold heading steels, the refining and pouring operation along with proper adaption of the molds to the grade of steel, are of great importance. Rimmed, "effervescent," or killed steels are supplied depending upon carbon content or demand of the consumer.

*A paper presented before the American Society for Steel Treating at Detroit, October, 1933.

In the manufacture of ingots the quality of the steel used is of prime importance and the better this material, the more care is needed in the making. An accurate record is kept of the temperature of the ingots during rolling and they are subjected to numerous tests in order to judge their suitability for cold heading. They are again carefully examined and the results noted before being prepared for wire drawing.

+ + +

Certain standard specifications have been adopted by the manufacturers covering three types of wire for cold heading and these are accurately followed. In the bundling room the wire is finally tested for grade as ordered, physical properties and surface imperfections. A complete history of the steel is then available, which includes definite information on the manufacture and rolling processes and all routine tests*

+ + +

Blooming Mill

AN ingot evenly and thoroughly soaked is drawn from the soaking pits at approximately 2350 degrees Fahr., varying possibly a few degrees, depending upon carbon content, and enters the blooming mill approximately at 150 degrees lower than the drawing temperature due to loss of heat in travel. In the rolling, light drafts are beneficial, similar to forging which tends to eliminate rupture or cracking, which would later develop into seams. After the second draft, the ingot is turned and, thereafter, is turned every other draft until reduced to size for entering the continuous billet mill. The turning of the billet equalizes the work and reduces the collar marks, thereby minimizing the possibility of laps which would carry through to the finished billet.

+ + +

AN observer witnessing the rolling of ingots, records such information as temperature, number of drafts, and condition of surface. This report is passed on to the inspector at the billet mill and this report governs whether or not the ingot or melt is suitable for cold heading products.

+ + +

BEFORE entering the billet mill the bloom travels to a hydraulic shear and sufficient top and bottom discard taken to insure against piping and undue segregation. The amount of discard is governed mostly by grade of steel and type of mold used.

+ + +

Continuous Billet Mill

THE bloom enters the continuous mill at approximately 1850 degrees Fahr. and delivers at about the same temperature, in a 1¾ to 1⅞-inch billet which is sheared on a flying shear to the desired length for charging into the rod mill furnace.

+ + +

DURING the rolling of the melt occasional crop ends are pickled to determine if there are any indications of laps, seams, or guide scratches. The pickling tank is installed near the flying shears and this test enables the roller to have first hand information as to the quality of the product he is making.

+ + +

Inspection and Testing of Billet on Hot Bed

AFTER the melt has been rolled, the inspector carefully checks

the observers' record of each ingot. Should any or all ingots show surface imperfections such as laps, cracks or scabs, this particular ingot or melt is not used for cold heading. Of the selected ingots a further inspection is given, such as the examination of ends for piping, surface inspection for laps, seams or scratches. The inspection for laps, seams or scratches, is further augmented by an upset test. This test comprises six or eight pieces about four inches long, cut from ends of billets, which are reheated and forged to about two inches. This definitely determines if there are any seams or laps present. The selected billets of the melt are then ready for rod rolling. From this point on, melts are kept separate and are labeled with tin tags showing the grade and the melt number.

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Continuous Rod Mill

BILLETS are charged into a continuous furnace and delivered to the continuous rod mill at approximately 2100 degrees Fahr. and finished 100 to 200 degrees Fahr. above the upper critical point (Ac_3). This finishing temperature together with slow cooling produces grain growth, and the separation of ferrite and tends to reduce rolling strains. Slow cooling may be attained by individually covered conveyors which travel at each interval as a coil of rods is delivered from the mill. This structure resembles that of a normalized rod. The accompanying photomicrographs show the structure of a hot-rolled billet, hot-rolled rod, and of cold-drawn wire. By comparison it can be noted that the object is to endeavor to maintain the structure of the billet in the finished wire, except that a more rounded or equiaxed grain is preferable.

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Inspection and Testing of Rods

THE first inspection of the rod is at the finishing mill. A test is cut from a bundle before entering the covered conveyor and is inspected for gage and surface. This test is then given a 720-degree twist while hot, for determining seams or laps. Testing at this point again enable the roller to know the quality of the product he is making. The final inspection of the rod is after the bundle leaves the covered conveyor. Here it is inspected for surface and gage; also subjected to a nick and break test for piping, seams and laps. The rods are then delivered to the cleaning house for the preparation of wire drawing.

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Cleaning House

THE rods are given a still pickling in sulphuric acid, the percentage of acid and temperature depending upon the amount of scale. As brought out in the rod rolling, the finishing temperatures are very high which produces a heavy oxide, particularly so on some grades of steel. Therefore, the main factor is to get the rods pickled clean and as quickly as possible. After pickling they are water-rinsed to remove the acid, and sprayed with a high pressure hose to remove any particles of scale. They are then lime dipped which tends to neutralize any trace of acid and effect a coating which is necessary in wire drawing. The rods are then baked at 250 to 300 degrees Fahr. for approximately eight hours, which thoroughly dries the lime and gives an adhesive coating. Baking also will remove any hydrogen absorbed in pickling.

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THE coatings are also obtained in the cleaning house and are usually bright, light or heavy sull coated, and light or heavy sull coated with heavy lime. Bright wire after pickling is rinsed in clean water and immediately dipped in cold lime, while light and heavy sull coatings are attained by varying the time factor between the rinse and lime tub. Heavy limed wire is obtained by dipping in a hot lime tub.

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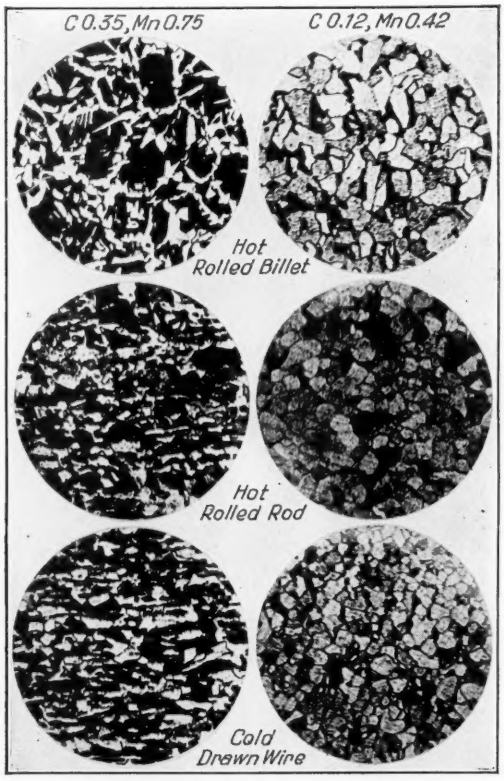
Wire Drawing -- Dry

THE majority of cold heading wire, cold drawn one hole from



Photomicrographs of Basic Open-Hearth Carbon Steel. Billet to Wire. ✦ ✦ ✦

the rod, is drafted approximately thirty-five one-thousandths. It is then drawn through tungsten carbide dies to a single driven twenty-six block running approximately forty-five revolutions per minute. The tungsten carbide dies produce a very smooth wire accurate to gage, and while the initial cost is great, these dies are conducive to long life and low cost maintenance. The lubricant used is either grease or soap, depending upon finish desired by the consumer. In most instances grease-drawn wire is furnished.

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Types of Wire For Cold Heading

MANUFACTURERS' Standard Specifications adopted by the Association of American Steel Manufacturers, Technical Committee, 1933, gives three types of wire:

(1) Annealed, or annealed, cleaned and lime coated—when maximum softness and ductility are required, and a bright surface is not essential.

(2) Bright processed — when maximum softness and ductility with a bright smooth surface are required. Wire so processed is necessary for severe cold heading operations; where the diameter of the head is 2½ times greater than the diameter of the wire—where the head is very thin—or where there are sharp corners to fill out under the head.

(3) Bright—when only moderate cold heading or cold forming is done.

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MANUFACTURERS' Standard Specifications also mention that grades 30 and 35, "25 to 40 carbon," should be ordered drawn from normalized rods to insure the necessary uniformity and plasticity for cold heading.

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Final Tests and Inspection

THE wire is delivered to the bundling room for final tests, inspection, and bundling in the order following: The wire is first checked for grade as ordered. Series of tests are then cut for the determination of chemical and physical properties; the physical properties are based on one hole wire as being approximately 20,000 pounds per square inch higher in ultimate strength than the rod from which the wire was drawn.

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WIRE is given surface inspection for finish, scratches or slivers, and micrometer reading for gage as ordered, with permissible variation of plus or minus two one-thousandths.

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TESTS are then cut from both the front and back end of each coil, of which one-half of each is given a nick and break test for piping. The other half of each piece is given a twist test of 360 degrees and back, to determine seams or laps. As a further safeguard at the time this inspection is being carried on, several pieces throughout the melt are cut about four inches long, immersed in a 50 per cent solution of hydrochloric acid for ten minutes, at approximately 170 degrees Fahr., for determining the general surface condition. Frequently pieces are sawed from these tests and forged cold in order to predict the results of processing in consumer's plant.

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AFTER the final inspection there is available a complete history of the steel involved. This includes comprehensive data relative to the manufacture and rolling processes, along with the numerous routine tests previously outlined.

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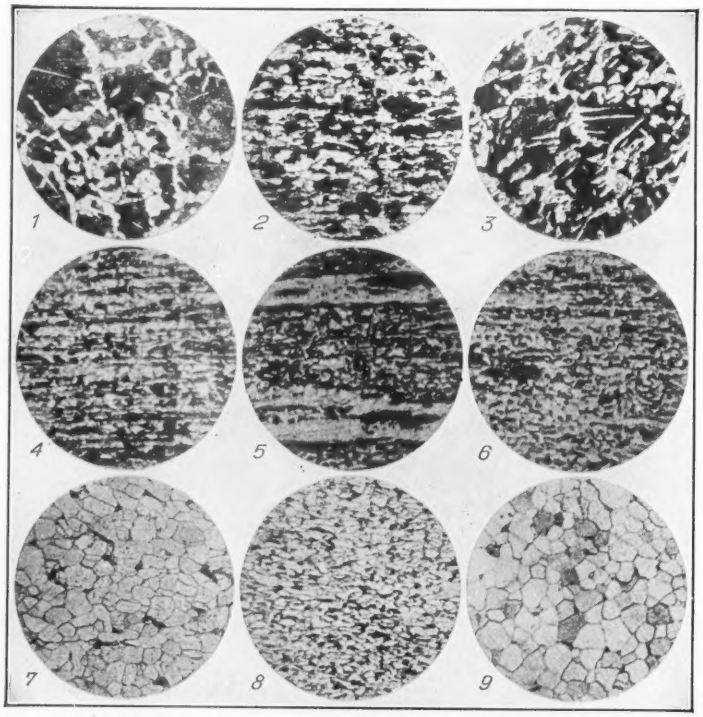
IN conclusion it may be stated that along with advanced steel making, metallurgical control plus ways and means of testing, play an important part in the steel industry. Close cooperation between the consumer and manufacturer as to the articles to be upset and the method of upset, enables the inspection department to better carry on its duties and deliver a satisfactory product.



Photomicrographs of Carbon Steel Wire for Cold Heading
Fig. 1—0.33 Per Cent Carbon from Normalized Rod.
Fig. 2—0.35 Per Cent Carbon from Pot Annealed Rod.
Fig. 3—0.35 Per Cent Carbon from Hot-Rolled Rod Finished Above Upper Critical and Slowly Cooled.
Fig. 4—0.36 Per Cent Carbon from Hot-Rolled Rod Finished Below Upper Critical.
Figs. 5 and 6—0.16 Per Cent Carbon Screw Stock. Sulphur Segregation.
Fig. 7—0.12 Per Cent Carbon from Hot-Rolled Rod Finished Above Upper Critical and Slowly Cooled.
Fig. 8—Same as Fig. 7 But Finished Below Upper Critical.

Seams for Fourdrinier Wires

Part I

By Kürt Jahn, Sallfeld, Thrg. Germany

A description of the methods in use in Germany for obtaining an endless wire belt for fourdrinier paper making machines. The article particularly describes methods of producing various kinds of seams for joining the belt.

TO obtain an endless belt, the two ends of a woven wire cloth for fourdrinier paper making machines have to be joined by means of a seam. This connection of the two ends of the wire is done in two operations:

First: At each end of the wire cloth a side-seam has to be made reinforcing the sieve-ends and preventing the last weft wires going out of the cloth by any strain.

Second: The ends thus prepared have to be joined. In the following this connection is designated as join.

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EMBRACING only the *last* weft wire of each sieve-end, this join is very flexible. Therefore, such a seam is called *"Joint-seam"* or *"articulation-seam"*. Photo 1 illustrates an articulation-seam at plain cloth, photo 2 the same joint-seam at triple-warp cloth.

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HOWEVER, if the closing wire of the join rests upon the **penultimate** weft wire, the seam can no more move. Then it is a so-called **rigid seam.** Photo 3 illustrates such a rigid seam at plain cloth, photo 4 at triple-warp cloth.

AT the seam shown in photo 4 there do not exist side-seams by stitching forming wires. However, the last weft wires are fastened with the warp wires by melting, soldering or welding, and they are thus prevented from getting loose from the cloth.

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THE seam of fourdrinier wires has to be resistant enough as otherwise the life of the fourdinier wires on the paper machine would be unfavorably influenced. It furthermore has to give a good drainage of the paper pulp. The seam is also not allowed to project over the total surface of the belt in order to avoid every unnecessary marking of the paper. The flexibility ought not to be too tight or too loose, and the seam must be adapted to the paper quality for which the fourdrinier wire shall be used.

AT the articulation-seams or joint-seams, the last weft wire has to be fastened very solidly by means of the stitching forming wires of the side-seams since otherwise it would be drawn out of the cloth by the stress-strain of the join. To obtain this solidity, the side-seam is arranged by a thick wire very closely threaded. In this seam the closing wire of the join is short and less subjected to wear. Therefore, it can be also thinner.

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AT the rigid seams, however, you get a sufficient reinforcement of the sieve-end by fastening the last weft wire easily, but so that the penultimate weft wire cannot move whatever would be the strain of the join acting upon it. Therefore, here the stitching forming wires of the side-seams are of smaller size and they are arranged in wider distance. But the closing wire of the join embracing four weft wires (two of each side) is longer and more subjected to wear.

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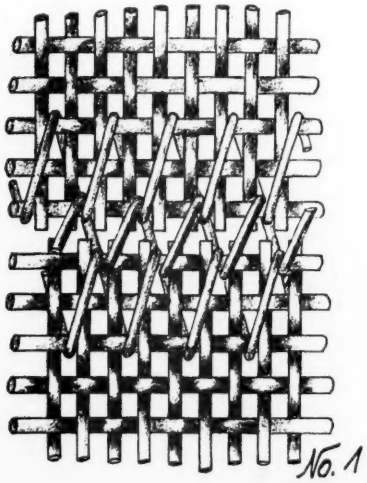
THIS second kind of seam giving a better draining than the foregoing one is often preferred.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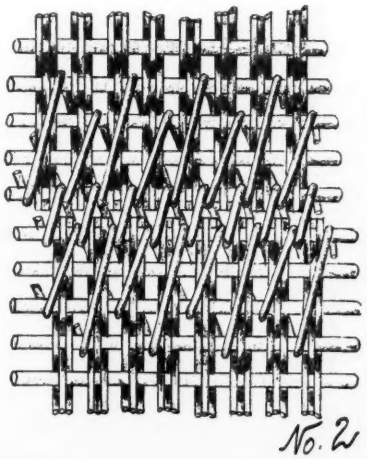
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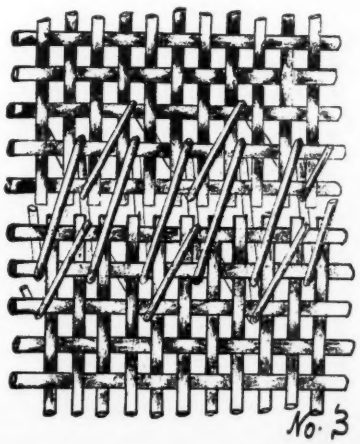
No. 3

But if fine fourdrinier wire is in question, in most cases only a trial on the paper machine will show the most advantageous seam for a certain purpose.

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THE solidity of every seam lies in the fact that the stitching forming wires of the side-seams and the closing wires of the join have to be protected from wear by concealing them as far as possible between the crimps of the warp wires. They ought to form only the least possible additional thickness if they are not additional wires reinforcing the proper side-seams or protecting the join.

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THE side-seams can be made in different manners whether, as mentioned in the foregoing, by wires arranged by hand through the mesh openings, or by melting, soldering or welding the ends of the warp wires with the last weft wire, or by embracing the weft wire with a part of the warp wires which are then sewed up or spliced into the cloth. The latter kind of seam is chiefly used for coarse cabled (twisted) fourdrinier wires.

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Protection of the Seam

TO increase the solidity of the side-seams you can reinforce them by arranging a second wire. The join, too, can be made with one or two wires.

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A SPECIAL protection of the seam is illustrated in photo 5. For draining the paper pulp on the fourdrinier paper making machine, the endless wire cloth belt has to run over a number of rollers and specially over the cover of the suction boxes. This wears heavily the seam which then must be renewed meaning a reduction in the length of the fourdrinier wire. However, the endless belt is not allowed to be shortened but it always must keep the same length. Therefore, it gets useless when the seam is destroyed, as then it is wasted and must be thrown away.

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FOR protecting the seam, often a wire is arranged before the seam by guiding it over the whole width of the fourdrinier cloth in zigzag or serpentine lines. But this gives an unfavourable effect on the other side because the wire sewed up on both sides marks the paper formed upon it.

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TO get a perfect protection of the seam avoiding the non-desired marking of the paper, small ramp-like elevations of metal or the like are arranged mechanically or by soldering on the underside of the warp wires, shortly before the seam. These ramps can be of any form, whether arched or flatly mounting and steeply descending. You can also use ramps of bent wire instead of full metal ramps.

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THE ramplike elevations can also be obtained by corresponding crimps of the warp wires. In this case the deepenings on the upper side formed by these special crimps have to be filled up with any mass in order to prevent the paper pulp getting into these deepenings and to form then corresponding elevations. The number of elevations can be chosen at will.

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PHOTO 5 shows in figure 1 an underside-view of a fourdrinier wire with the elevations soldered on the warp wires. Figure 5 shows in a schematic drawing the second example. Figures 2, 3 and 4 are illustrating the run of the fourdrinier wire over a roller.

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OVER roller "a" the fourdinier wire cloth "b" passes. The seam is designated with "c". In the direction of the fourdrinier wire's run, shortly before the seam "c" or even overbridging the seam "c", elevations "d" are soldered on some warp wires at the underside of the fourdrinier wire "b". At the second form (figure 5) these elevations are formed by corresponding crimps e of the warp wires and filled up with a mass "f".

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THESE elevations are effecting a lifting of the fourdrinier wire cloth over the rollers when the seam passes them so that the seam cannot be damaged by the rollers. The life and resistance of the fourdrinier wire cloth is thus essentially increased.

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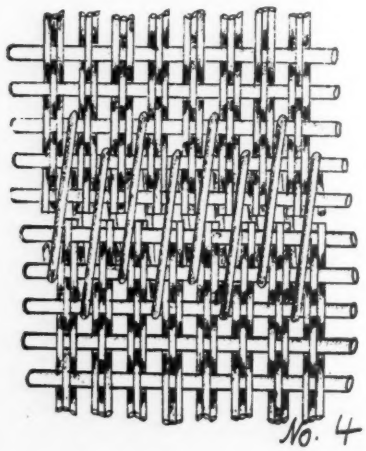
TO find out a seam covering all requirements of practical use (long life, good draining of the paper pulp, no marking of the paper etc.,) as perfectly as possible, the most important fourdrinier cloth makers have developed



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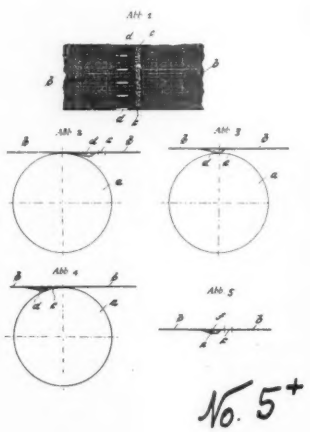

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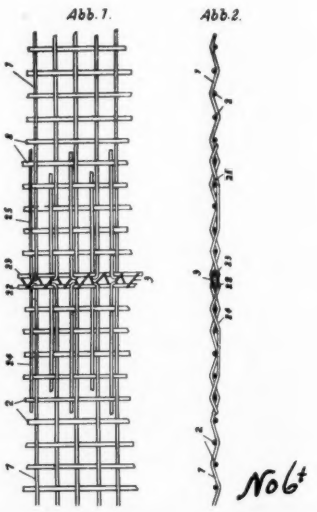

No 6

special seams. In the following some of these special seams are briefly described. The photos are clearly illustrating the typical construction of these seams and their advantages. All seams marked with a cross (+) are patented.

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Special Seam; See Photo 6 +

THIS seam contains on both sieve-ends reinforcing wires interlaced respectively spliced into the cloth in the direction of the fourdrinier wire's run. These interlaced reinforcing wires can be formed by lengthenings of the warp wire ends whether bent back and spliced into the same sieve-part or interlaced into the other cloth part.

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FOURDRINIER wires with similar seams often suffer under the disadvantage that they get loose in or near the seam. Careful examinations have proved that this defect is caused by the fact that the reinforcing wires hitherto were interlaced in such a way that they were running in greater lengths on the *inner* side of the fourdrinier cloth, i.e. on that side which is directed to the draining devices (suction boxes and rollers) of the paper machine. The result is that the reinforcing wires projecting somewhat at the mentioned spots are worn out by the friction chiefly on the suction boxes quicker than the wires of the fourdrinier cloth themselves, thus causing a premature breaking of the cloth at the seam.

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THE special seam according to photo 6 avoids this inconvenience, by arranging the seam in such a way that the interlaced reinforcing wires are lying with the greatest part of their length on the *outside* of the endless belt. Only at single points closely embracing the weft wires, these reinforcing wires are running on the inner side which is directed against the suction boxes and against the rollers. Such a fourdrinier wire is essentially more durable since the interlaced projecting reinforcing wires do not touch the above mentioned parts of the paper machine and are not subjected to heavy wear. By arranging the reinforcing wires on the outside of the fourdrinier cloth, there may possibly arise a greater marking of the cloth seam in the paper. But for cellulose, mechanical wood pulp, coarse papers, boards and the like, this is not to be considered as a disadvantage, since at the manufacture of such papers the life of the fourdrinier wire is primordial.

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THE best way is to arrange the reinforcing wires so that they go on the *inner* side of the cloth only over *one* cross weft wire. It has also to be considered that the interlaced wires do not run over those points where warp and weft wires are crossing one another in order to avoid unevenesses which otherwise could arise. At the seam according to photo 6 the cloth can be practically perfectly flat and plain on the inner side.

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PHOTO 6, figure 1 shows a part of the seam on a cloth seen from above. Figure 2 is a side-view of the same seam. In the drawings, number 1 indicates the warp wires and number 2 the weft wires. The projecting ends of the warp wires are bent back at the seam and embrace the last weft wire 22 respectively 23. They are spliced between the wires of the cloth in such a manner that at no point more than two wires are lying one over the other. The last weft wires of both sieve-ends are fastened and held together by means of a closing wire 3 wound around them. This closing wire 3, therefore, is effecting the join.

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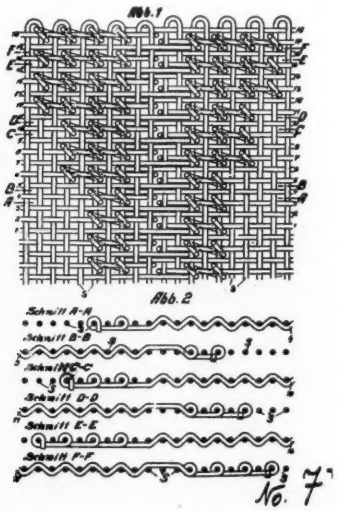
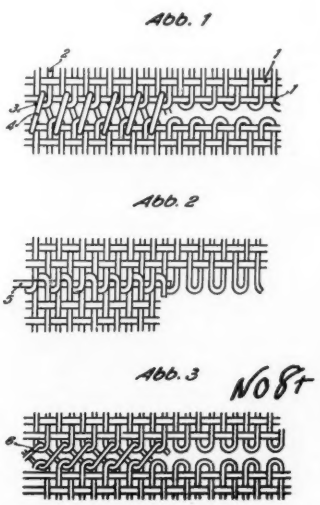
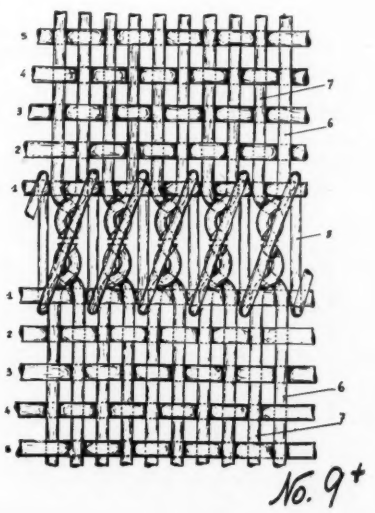
Special Seam; See Photo 7

AT the seams formed by interlacing or splicing the projecting warp wire ends of both sieve parts into the ends of the adjoining sieve parts, there is generally the drawback that the fourdrinier cloth becomes too close and dense *at the seam*, thus unfavourably influencing the draining and flexibility of the seam. At the seam according to photo 7 the projecting warp wire ends of both sieve-parts







are alternately partly cut up and partly spliced into the meshes of the opposed sieve part. This splicing must be done in such a way that the warp wires are wound in loops one or several times round several crossing-points of weft and warp wires, and that they are running slopingly backward over the weft wires lying below. Hereby, the seam remains plain and elastic, since in the whole width of the cloth, from one end to the other, each warp wire spliced into the other sieve part is opposed by a warp wire cut up closely behind the last weft wire. The draining of the seam thus is only little prejudiced.

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PHOTO 7 illustrates such a seam. Figure 1 is a view from above on a seam. Figure 2 shows different sections through the various fastening points, and is a better illustration as only the crossed weft wires are shown at the embracing points.

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NUMBERS 1-18 indicate the warp wires of both sieve parts. They are interspersed by weft wires, whilst at the right the warp wires 2, 4, 6, 8, 10, 12, 14, 16, 18 of the left sieve part are cut up shortly behind their last weft wires, whilst at the right sieve part these are the warp wires 1, 3, 5, 7, 9, 11, 13, 15, 17 which are cut up immediately behind their last weft wire. The warp wires 1, 3, 5 of the left sieve part are spliced into the right sieve part in such a manner that they are wound slopingly backward around *two* such crossing points, at which the warp wire crosses below the weft wire. Between the two loops, the spliced wire runs under those crossing points at which the weft wire lies below. At the right sieve part it is proceeded in the same way with the warp wires 2 and 4. Sections A-A and B-B of figure 2 are illustrating position and ends of the warp wires 4 of the right side and 5 of the left one.

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THE warp wires 7, 9, 11 of the left sieve part and 6, 8, 10 of the right one embrace each *three* crossing points of the opposed sieve part in the same way as the previously mentioned warp wires. Sections C-C and D-D of figure 2 illustrate the course of the warp wires 10 of the right side and 11 of the left one.

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THE warp wires 13, 15, 17 of the left sieve part and 12, 14, 16, 18 of the right one embrace each *four* crossing points of the opposed sieve parts, ever in a loop directed slopingly backward. The course of the warp wires 16 and 17 is illustrated in sections E-E and F-F of figure 2.

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BY this kind of seam the reinforcing wires joining the two cloth ends are drawn faster and faster at spanning the cloth, so that any pulling out or drawing up of the seam is impossible. The special leading of the wires secures furthermore a perfectly plain surface and a good drainage. At the same time the join remains completely flexible and renders impossible a breaking off of the seam.

✦ ✦ ✦

Special Seam; See Photo 8 +

THIS special seam is easy to make, allows to arrange the seam at any place of the fourdrinier wire and renders possible, therefore, also to change the cloth length without any difficulty. This purpose is obtained by simply taking out of the cloth the last weft wires. The ends of the projecting warp wires are joined by striking them together from above and below and by soldering or welding them together in pairs. So, loops or eyes are formed, each one by two warp wires, and the seam for the endless belt is made by means of these loops or eyes.

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PHOTO 8 illustrates various seams made with the help of the so formed loops. In the three drawings, number 1 indicates the last weft wires and number 2 the warp wires, which are joined to loops 3 in the above described manner. According to figure 1, a closing wire 4 is wound around the last weft wire of both cloth ends whereat by the embracing loops the seam has got a higher tensile strength. According to figure 2, the seam is made by shaving a closing wire 5 through all loops of both cloth ends. According to figure 3, the loops of the two sieve parts are joined by a spiral closing wire 6 which can be arranged whether as single-thread or multi-thread spiral.

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THE loop formed by the ends of two warp wires can be made in any length. A somewhat greater length of the loops gives the advantage that these loops are running slopingly from above to below, whilst at the general soldering or welding of the last weft wires to the warp wires a vertical mesh opening results. This special seam has the great advantage not to mark the paper and to lie somewhat deepened since it runs through the loops in the midst of the cloth, imagined as section.

✦ ✦ ✦

Special Seam; See Photo 9 +

TO reinforce the two sieve ends before joining them, all warp wires are united at this seam in pairs by intertwining, intertwisting or binding them together behind the last weft wire of the cloth end. The joining of the warp wires one to another is secured by means of soft or hard soldering. Thereby, the last weft wire is securely kept in its position giving a high tensile strength to the seam.

✦ ✦ ✦

AT various other seams the last weft wire of each cloth end is fastened by soldering it to the ends of the warp wires. This causes the disadvantage that the weft wires lose an essential part of their resistance by annealing, which enters at the soldering process. This diminution of the wire strength caused by the soldering heat is rather high, since solderings with high melting point have to be chosen, because these solderings have to transfer the tensile strain. However, at the special

(*Please turn to page 25*)

Manufacture of Non-Ferrous Seamless Tubes by Piercing and Extrusion Methods

By Gilbert Evans

The practical phases of rotary piercing and of extrusion methods for tube manufacture in Great Britain are reviewed. For the modern tube works it is claimed that the rotary piercer and the extruding press are essential.*

IN modern manufacture of seamless tubes it is essential to employ both the rotary piercer and the extrusion press, the first-named for production of tubes of large and the latter for tubes of smaller diameters. By means of the rotary machine, equipped with the necessary power and adjustments, shells capable of being cold-drawn to 20 in. are being regularly produced, and there is no reason why 24 in. diameter or more should not be attained. As stated previously, this is accomplished by first piercing the solid billet and supplementing this process by a series of expanding and re-expanding passes through the same mill until the necessary diameter and wall thickness are attained. Applied to ordinary commercial and running sizes of from 7 in. down to 2 in., the desired diameters are produced from the solid billet in one operation, direct from the solid round billet, to the weight of which there is practically no reasonable limit. The standard length of the casting varies from 4 ft. to 6 ft., but diameters of 9 in. and 12 in. of 7 ft. in length are at times necessary to produce large sizes by the supplementary expanding. Reference to the Fig. 1, will indicate the everyday products of a modern rotary mill, the sizes of which are given in the accompanying table.

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THE vertical hydraulic extrusion press is particularly well adapted for the production of shells for finishing, with a minimum of cold-drawn treatment, into small-diameter tubes, although the author is aware that diameters up to 7 in., with comparatively thin walls, are also being regularly manufactured. Intensive attention to the smallest details is necessary to avoid eccentricity in thickness, which is clearly the greatest bugbear to the practical tube manufacturer.

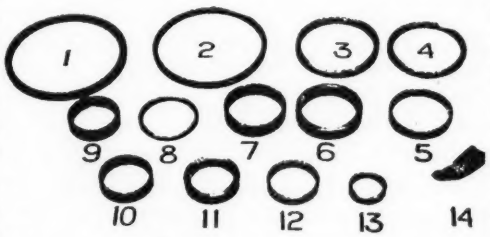

Fig. 1. A range of products which represents the normal practice of a modern rotary mill. ✦ ✦ ✦

The Serck Extrusion Patents

THIS press, manufactured in Great Britain under Serck's patents by Messrs. Fielding and Platt, Ltd., Gloucester, is of simple design, and reliable for the uniformity of its products, and may be erected in keeping with its environment either on floor level with vault below, or on a raised platform, so that the resultant shell is delivered on to the working floor of the department. A curved channel from the delivery end of the plant receives the shell, and while still in a pot state the product is straightened by suitable methods, entirely free from kinks or waves, a state which is essential to the subsequent finishing treatment by the cold-drawing process. The furnace for heating of billets by gas, electricity, or oil fuel is arranged in suitable proximity to the press, and, in the case

Table.

Dimensions of Sample.			Original Billet Size.	Remarks.
No.	O. D.	Wall.		
	In.	In.	In.	
1	8 3/4	1/2	6	Expanded
2	8 1/4	11/32	5	Expanded
3	5 15/16	3/8	4	Expanded
4	5 19/32	13/32	3 1/2	Expanded
5	4 7/32	7/32	4	Pierced Only
6	4 15/32	11/32	4	Pierced Only
7	4 3/16	7/32	3 3/4	Pierced Only
8	4 1/32	9/32	3 1/2	Pierced Only
9	3 7/16	3/16	3	Pierced Only
10	3 1/2	9/32	3	Pierced Only
11	3 19/32	3/8	2 1/2	Pierced Only
12	3 3/8	7/32	2 1/2	Pierced Only
13	2 3/8	13/64	2	Pierced Only
14	1 25/32	5/32	1 1/2	Pierced Only

Non Ferrous Seamless Tube 1. ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦

*Published by permission of "Metallurgia". The British Journal of Metals.

of the raised platform, the solid billets are delivered to the charging door by means of an automatic conveyor. The extrusion press under consideration may be operated direct from pumps or from accumulator pressure, and consists chiefly of the main pressure cylinder and ram, sliding container casing and container, with valve-box under the direct control of the operator; an assistant attends to the reheating furnace, conveying the material, inserting it into container and adjusting the guide bush and piercing and extruding mandrel.

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THE chief operator changes both the die and mandrel after each process, which period allows ideal cooling of these important details, and he also positions the cutting-off tool and removes the thin disc of scrap from the container by means of a hook. The diagrammatic sketch at Fig. 2, although not drawn to scale, illustrates the "principle" of the Serck process. While the diagram is self-explanatory, a brief description is given for reference.

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AT the start of the shift's work, the container is slightly heated, and the inside surface, after being thoroughly cleansed, is prepared with a dressing suitable for the non-ferrous material. When the billet whose surface has been turned attains the required temperature it is withdrawn from the furnace hearth and inserted in the container. The guide bush is placed in position on the top of the container and billet, and the piercing-extruding mandrel placed in the guide-bush. As will be observed by the diagrammatic sketch at A, the last-named tool is self-centering in the ram attachment, and is floating and not fixed as in some presses. The combination of the floating mandrel and guide-bush is, from personal experience in similar plant in use in the steel tube trade, a great factor in producing concentric shells. Immediately the tools mentioned are in position the leading hand admits the pressure from pumps or accumulator to the main ram, which

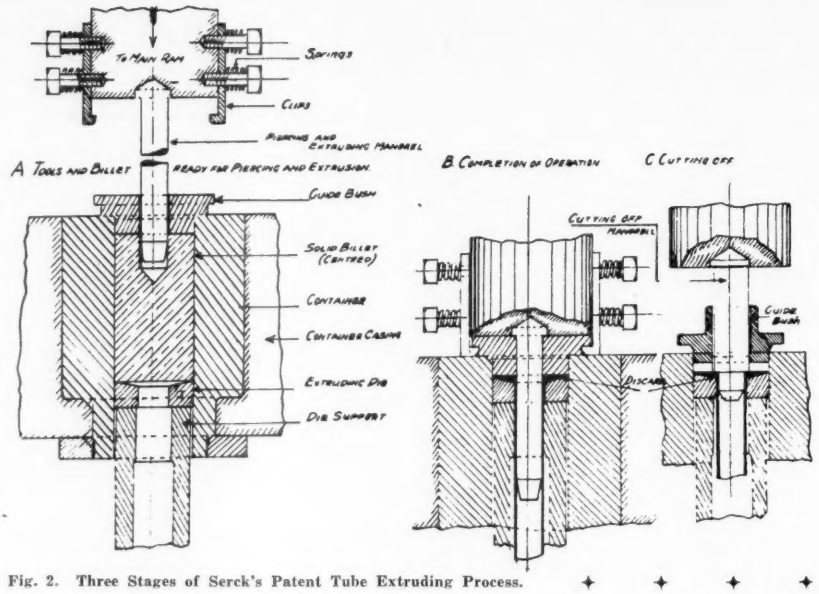

Fig. 2. Three Stages of Serck's Patent Tube Extruding Process.

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forces the mandrel through the billet. On completion of this piercing stroke the mandrel enters the extrusion die and continuance of the pressure forces the pierced billet over the mandrel and through the orifice of the die, the difference in the tools' respective diameters governing the thickness of the resultant shell.

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IN this patent process the whole of the container and casing progresses through the actual extruding until the guide-bush almost contacts with the bottom extruding die. Hence the term sliding container. For the extraction of the mandrel a novel gadget in the form of two hooked brackets engages the top collar of the guide-bush as at B, and the upward stroke of the main ram—which is governed by two small hydraulic cylinders contained in the body of the main ram—extracts the mandrel from the shell. Meanwhile, the container and casing is held down at its finishing position by an outside catch. A second guide-bush and cutting punch is put in position, and pressure applied to the main ram effectually severs the long shell, leaving a small disc of discard or scrap, which is removed by the operator, who also changes the die. The release of the catch and application of compressed air returns the container to its original position ready for the next operation. The output of the plant under review is governed by the billet-heating capacity of the furnace and power supply, and a shell 20 ft. to 40 ft. long is extruded in about 30 secs. from the time the solid billet leaves the furnace foreplate.

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IN the length of the container it is necessary to allow for elongation of the billet while under the piercing operation. These presses are made of 1,000 and 500 tons ultimate pressure, and are of steel throughout, the working surface of the main ram being sheathed by a gun-metal case. Adaptations are made for working pressures up to 3,000 lb. per sq. in., and complete plants are working successfully in Great Britain and on the Continent. Successful trials have been carried out in manufacture of seamless tubes of stainless steel under working conditions, but at a much higher temperature, similar to those governing extrusion of non-ferrous metals.

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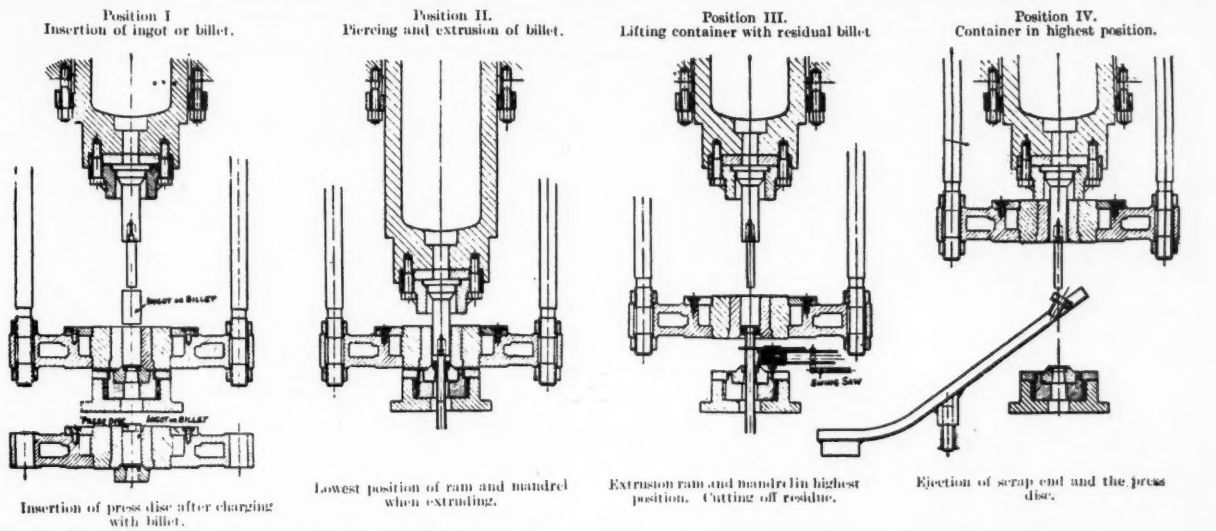
The Fried. Krupp Vertical Hydraulic Extrusion Press

IN recent times many British and Continental manufacturers of non-ferrous tubes have installed verticle hydraulic extrusion and successfully worked the Fried. Krupp press and brief reference is

necessary to some of the principles included in its design. The main cylinder is embodied in the press frame, which is of cast steel, this method ensuring the necessary rigid connection and eliminating the possibility of any part becoming loose, as is sometimes the case where columns and bolts and nuts are employed. The press ram is packed with hydraulic packing, which is easily accessible for replacement or tightening from the outside. The return motion is effected by means of two retractor pistons arranged laterally on the press cylinder, the pistons being connected with the press ram by a traverse guided on slide surfaces, which may be adjusted by suitable wedges.


Position I
Insertion of ingot or billet.
Position II.
Piercing and extrusion of billet.
Position III.
Lifting container with residual billet
Position IV.
Container in highest position.
Insertion of press disc after charging with billet.
Lowest position of ram and mandrel when extruding.
Extrusion ram and mandrel in highest position. Cutting off residue.
Ejection of scrap end and the press disc.

Extruding Methods when Extruding with a Movable Mandrel.

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AN air vessel for prefilling with low pressure is located beside the main press, and is used to quicken the idle advance movement of the main ram, accumulator pressure being used only towards the end of stroke.

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THE container into which the billet to be extruded is conveyed is inserted between the press ram and the lower part of the press frame, and vertical motion is imparted to it by two pistons, also arranged laterally on the press frame. When in its lowest position the container tightens against the die-holder located on the lowest section of frame, and in its top or uppermost position it leaves space between its lower face and the die for introduction of an electric-driven pendulum saw, which severs the extruded tube from the residue or pad of scrap left at the base of the container. Extrusion plants, similar in principle, are provided with a fixed container,* and in this case the severing of the residual pad, left in container at completion of the tube-extruding operation, is done by the introduction of a punch to which the power is applied. After severance the pad of scrap is drawn up out of the container on the return upward stroke of this appropriately shaped tool.

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The Movable Container Type of Press

THE extruding die is mounted on a movable holder, which slides in a direction transverse to the direction of pressing, and can be brought by hand, when necessary, into a position for change of this important tool, which is removed from its holder by means of a small hydraulic ram. When the die-holder is thus placed away from the working centre of the press, the residual metal left in the entainer is pushed out clear by full extrusion pressure. A decided feature is the circular cutting-off saw previously mentioned. This tool is of the pendulum type, and swings to a working position in a horizontal direction.

Reference to the diagrams in Figs. 4 and 5 will indicate that these hydraulic plants, as applied to tube extrusion, are of two types —viz., Fig. 4 showing the operations with a movable mandrel, and Fig. 5 the operations with a fixed mandrel. In each case the progress of the operation is outlined.

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Extrusion of Tubes by Use of Movable Mandrel

Position 1.—The ram with the mandrel is at its highest position. The container stands below on the die mandrel, so that between the mandrel and container the heated billet can be inserted in the latter. The pressing disc, as shown in bottom sketch, is then placed in position on top of the billet.

Position 2.—The ram and mandrel are moved by means of low pressure until the mandrel contacts with hot billet.

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AT this point the accumulator pressure comes into operation at first pierce, and on completion of this stage to complete

*Note.—The author, owing to the amount of space available, has considered it necessary to confine his review to the movable container type of press as being sufficient or comparison with the method discussed in the fore part of this article.

the extruding of a tube between the die and over the mandrel, the thickness of the shell being governed by the difference between the die and mandrel diameters divided by two—e. g., die, 1¾ in. diameter; mandrel, 1½ in. diameter; difference between these two diameters, ¼ in. Resultant tube ⅛ in. well thickness.

Position 3.—The ram and mandrel are drawn up to their highest position. The container is lifted only far enough to allow the saw to come into action between the container and the mandrel, so that it can sever the useful length of the shell from the pad or residual piece of the heated and pierced billet. The shell then glides down through the die and passes along the discharge channel, after which the saw is turned outwards to its original position.

Position 4.—The container is carried to its highest position, thereby bringing the pressing disc and residual piece of billet against the extended sleeve attached to the main ram which ejects them into the trough as shown. After the container is again lowered to its bottom position the plant is ready for the next operation.

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Extrusion of Tubes Used by Use of Fixed Mandrel

Position 5.—The ram and mandrel are at their highest position, and the container stands below on the die mandrel, so that between the mandrel and the container the heated billet can be inserted into the latter. The pressure disc, as shown in bottom sketch, is then placed in position on top of the billet. Note position of piercing and extruding mandrel.

Position 6.—The ram and mandrel are lowered jointly by means of low pressure until contacting with the heated billet, when the accumulator pressure is applied with similar effect as set out in Position 2, Positions 7 and 8. See descriptions at Positions 4 and 5.

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IN conclusion, it may be mentioned that the extruding presses under review are of 600 tons capacity, and may be fixed either on the mill floor level, with suitable chamber built underneath or, alternatively, be erected on a raised platform, so that the extruded shell is delivered on to the ordinary working floor level. Other hydraulic presses for operating on metals and alloys of high tensile strengths are supplied, of ultimate pressures up to 2,000 tons.

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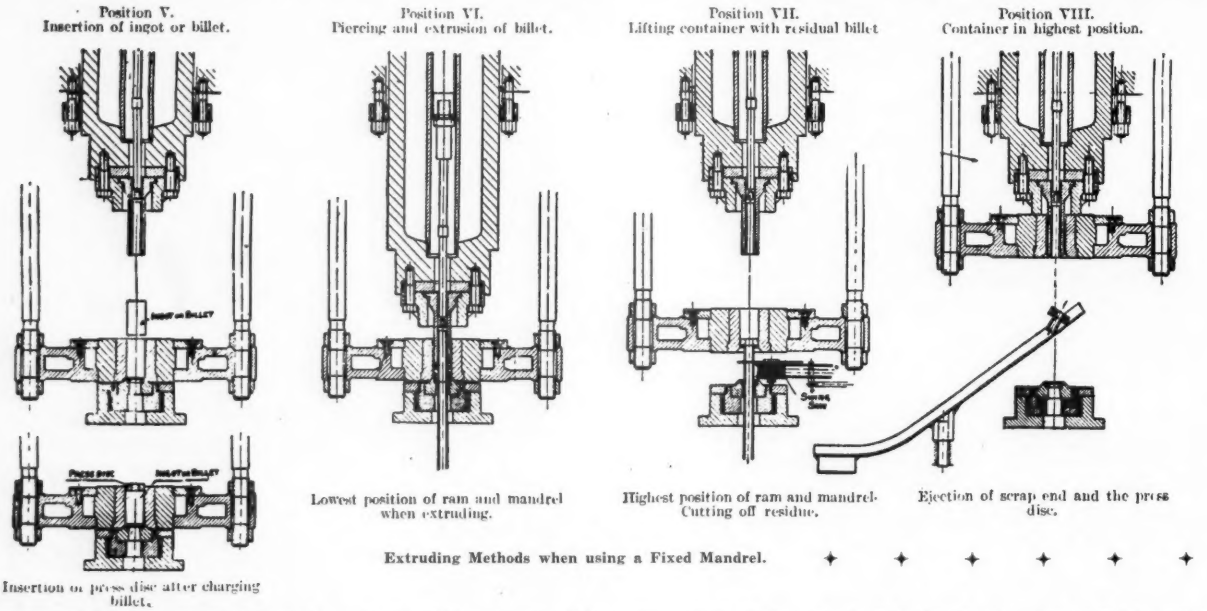
HAVING reviewed within the amount of space at one's disposal the practical phases of rotary piercing and of extrusion of non-ferrous metals for the manufacture of tubes, one touches diffidently and briefly on the purely technical phases of the methods. Research by competent authorities reveals the fact that varying temperatures are essential to various alloys, inasmuch as a difference of 10° in the heating of the same material nearly doubles the velocity of extrusion through the same aperture. It is also recognised that different alloys are necessarsarily subjected to different velocities of extrusion, and this is a case in point where agreement between the technical and practical staffs probably leads to dependable and uniform results so necessary when viewed from the commercial aspect. The tabulated results of Jammann in this connection, although primarily applied to solids and sections, are worthy of study, as they are made over a wide field of material. It must be borne in mind, however, that the art of extruding as understood to-day is, comparatively, still in its infancy, the most marked developments having occurred since the end of the last century—viz., from non-ferrous rods to sections and tubes, and so on to steel of various qualities. The process has its limits in dealing with large diameters and weights, and one of the chief factors on which success depends is

(*Please turn to page 25*)


Position V.
Insertion of ingot or billet.
Position VI.
Piercing and extrusion of billet.
Position VII.
Lifting container with residual billet
Position VIII.
Container in highest position.
Insertion of press disc after charging billet.
Lowest position of ram and mandrel when extruding.
Highest position of ram and mandrel. Cutting off residue.
Ejection of scrap end and the press disc.

Extruding Methods when using a Fixed Mandrel.

Exports and Imports of Wire

Exports of iron and steel wire products in Oct., 1933 and Oct., 1932
(In gross tons)

	Oct. 1933	Sept. 1932	Oct. 1932
Wire rods	2,645	428	1,123
Hoops, bands and strip steel	1,424	1,729	1,161
Plain black or galvanized iron or steel wire	3,420	2,947	571
Barbed wire and woven wire fencing	2,661	3,283	1,500
Woven wire screen cloth	74	70	53
Wire rope	258	135	198
Insulated iron or steel wire and cable—see analysis below			
Other wire and manufactures	357	229	109
Wire nails	832	1,050	365
Tacks	25	47	20
Other nails, including staples	270	301	124
Bolts, machine screws, nuts, rivets and washers	560	327	199
Total, these 11 classifications	12,526	10,546	5,423

Imports of iron and steel wire and wire products into the United States
(In gross tons)

Concrete reinforcement bars	85	147	1,669
Hollow bars and drill steel	71	108	34
Merchant steel bars	2,178	2,559	2,114
Wire rods	1,735	693	403
Barbed wire	311	434	949
Round iron and steel wire	261	171	150
Telephone and telegraph wire			
Flat wire and strip steel	210	143	77
Wire rope and strand	103	144	175
Other wire	77	108	109
Hoops and bands	2,351	2,461	2,904
Nails, tacks and staples	696	712	877
Bolts, nuts and rivets	41	3	41
Total, these 13 classifications	8,119	7,683	9,502

Exports of Insulated Wire and Cable

OCTOBER, 1933

	Lbs.	Value
Insulated iron or steel wire and cable	1,424	$ 368
Rubber covered wire	271,926	57,737
Insulated copper weatherproof wire	150,416	23,863
Wire and cable telephone cable	10,352	1,437
Other insulated copper wire	266,446	46,440
Nickel-Chrome Electric	59,405	52,887
Total, these 6 classifications	759,969	$182,732

EXPORTS in October exceeded those of September by 55,956 tons. Thirty-seven classes of material showed increased shipments to contribute to this gain and to offset the 24 decreases which marked the month's trade. The principal gain was that registered in exports of scrap (40,640 tons, but in addition there were gains of moment in tin plate (7,958 tons) and in wire rods (2,217 tons). A daily average of 5,315 tons was maintained throughout October as compared wiht 3,626 tons in September and with 3,883 tons in August.

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THE 1,008,507 tons exported thus far in 1933 exceeds the total export trade in iron and steel products of either the 1932 or 1931 calendar years, but there is little liklihood but that when the whole year is added up 1933 will fall short of 1930 by more than a half million tons—the total for that year having been just short of the two million ton mark.

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THE distribution of iron and steel exports in October was in direct contrast to the year's trend with the exception of the trade with the immediately adjacent countries of north and Central America and the West Indies. For example, principally on the strength of heavy scrap shipments to Italy, 26.1 per cent of the October export trade was with Europe as against an average trade of 16.2 per cent of the total for the elapsed ten months; North and Central America and the West Indies took 16.6 per cent of the October trade against 16.1 per cent of the ten months total; South America received 21.5 per cent against 10.6 per cent (largely because of sales of sheets, tubes, and rails made to Argentina and Brazil); Asia and Oceania took only 35.7 per cent against 56 per cent despite Japan's extensive scrap purchases; while Africa got only 0.1 per cent in contrast with 0/6 per cent for the year to date.

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DESPITE the poor comparative showing of Asia and Oceania in the foregoing comparison Japan remained the United States' largest market in October by taking a total of 42,934 tons of iron and steel goods including 34,969 tons of scrap, 4,673 tons of tin plate, and 2,400 tons of wire rods. Again because of extensive purchases of scrap—33,961 tons out of a total of 34,539 tons—Italy rose to the place of the second largest market for American iron and steel in October. Canada was third. Her total of 18,896 tons including a wide variety of items as well as 6,159 tons of scrap and 1,093 tons of steel bars. Argentina and Brazil were the fourth and fifth markets of the month respectively.

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THE import trade in iron and steel products receded from its record position of September to total only 46,673 gross tons—9,033 tons less than in September. Most of the changes were in small amount—the two outstanding decreases being those in ferro-manganese (2,978 tons) and in scrap (6,528 tons). The only increase of moment being that of 1,042 tons in wire rods.

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ALTHOUGH her shipments to the United States were reduced by almost a half in October, Canada continued to reign as the principal supplier of iron and steel products, her total of 12,850 tons including 7,365 tons of scrap and 4,458 tons of ferromanganese. All of the British Indian total of 9,458 tons was pig iron as was 9,294 tons out of the Netherlands total

(*Please turn to page 26*)

'Round the World With the Wire Industry

Conditions in the German Steel Wire Industry

THE activity in the German iron and steel wire industry has been on an upward trend thus far during 1933, although isolated setbacks of a somewhat inconsequential nature have taken place from time to time. The gains recorded have been entirely in response to an increased domestic demand, exports having decreased slightly during the first eight months of 1933 as compared to the same period of 1932. The future outlook for domestic business appears good, but due to increased competition from other countries, notably Japan in the Far East and the United States in Latin America, the export trade is discouraging and in as much as the German wire industry was built to take care of a large foreign demand, in addition to the domestic business, it is thought that until some readjustment is made, the industry will continue to experience difficulties.

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THE sharp reduction in prices for wire products, as already reported, has stimulated the market to a certain extent, particularly in the Near East and Africa, although orders from South America are still missing.

Barbed wire orders are particularly noticeable because of the changed price schedule.

The demand for wire mesh for export is much greater for special wire cloth such as monel metal, stainless steel and aluminum alloys; the latter especially is in demand. Prices for these products are relatively satisfactory and it is worth noting that the countries which are still on the gold standard in all markets of the world are the keen buyers, South Africa, West Australia and Latin America being among the largest customers.

Stocks of wire products in Germany are very low at the present time and the trade has not yet started to buy.

Now that the industry is fully combined and figures of total production are available for the first time, we realize that the quantity of wire nails in stock is sufficient to meet the market requirements only for the next five or six weeks; stocks of galvanized wire on hand are only sufficient to meet an ordinary demand of three weeks; barbed wire, two weeks, and other common wire products on hand can only meet a normal requirement of from three to four weeks. Mill stocks were never so low as at present.

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Polish and German Agreement

WITH the agreement between the Polish and German steel industry now finally signed, it is very probable that the Polish wire industry will enter the IWECO. Until recently the Polish industry was a very difficult competitor for Germany on the wire nail market, particularly in North and Eastern Europe. The negotiations for this new combination are progressing well.

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Russian Needs in Wire Machinery

THE German wire industry reports of the Russian Government is in need of great quantities of wire and wire nail machinery but that German machinery manufacturers were disinclined to accept the conditions of payment ruling last year. The condition of the Russian wire nail industry is rather unsatisfactory, most of the machinery is worn out and according to the official reports the waste in normal production of nails is more than one-third of the amount produced and in all other wire products between 25% and 28%. This condition is chiefly due to the poor condition of wire nail machinery in Russia generally.

Before the German industry will accept any considerable quantity of Russian business there will necessarily have to be considerably better terms of payment arranged for. The Russians are asking for from 24 to 28 months credit and this, of course, the Germans are unwilling to grant.

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Japanese Sued for Patent Infringement

A number of German wire machinery makers have filed a law suit in Japan against the Japanese wire machinery builders, claiming that the Japanese have copied German wire machinery for which patents have been obtained in Japan by the Germans. The law suit is supported by the German-Japanese Chamber of Commerce.

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Use of Raw Materials to Govern German Purchases

THE German Post Office which controls the purchase of communication wires in Germany, has agreed that in future it will only buy wires of copper and other non-ferrous metals which are manufactured from German raw materials, as sufficient copper is now produced in Germany to cover the demand of the German Post Office. This regulation is being followed by other German Government departments who have issued similar rulings.

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Big Lithuanian Cable Contract for Britain

G. W. Moore, chairman of the Automatic Electric Co., Ltd., announces that his company, acting

for itself and a group of leading British cable manufacturers, had concluded a contract with the Minister of Communications of Lithuania for the conversion of the present manual telephone system in Kaunas, the capital of Lithuania, and Klaipeda, the principal port of the country, to the Strowger system. The contract is for the installation of 8,000 lines in Kaunas and 3,000 lines in Klaipeda, and the modernization of the cable network in these two cities. The work of installation is to be completed by September 1, 1936.

All the cables supplied will be manufactured in the United Kingdom.

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Obsolete Wire Gauge Refuses to Die

THE term **"Birmingham Wire Gauge"** is one which the metal world has for years tried to shed, but never completely succeeded in doing. Strictly speaking, there is no such gauge, and many people in the metal trades were considerably surprised to see it given fresh currency in British Additional Import Duties Order No. 20, published recently. Attention has been called to the longevity of this erroneous term by the London "Ironmonger," which urges all responsible parties to drop it once and for all.

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IN the Order referred to there occurs the passage "bandsaw strip . . . from nineteen to twelve gauge (Birmingham wire gauge) in thickness." The use of a standard long abandoned is unfortunate and its appearance in an official publication may lead to confusion. Well-nigh fifty years have passed since the Imperial Standard Wire Gauge (the "S. W. G.") was sponsored by the British Government and officially introduced in order to put an end to the troubles continually arising through the employment of so many varying gauges each affirmed to be the authentic "Birmingham Wire Gauge." The hoop and sheet mills then complained that they could not roll to the Standard Wire Gauge, and were accordingly placated by the introduction of the Birmingham Gauge for Hoops and Sheets, which was revised by the London Chamber of Commerce as far back as 1914.

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THE Stubs Gauge for wire, alternatively known as the Warrington Wire Gauge, retains a kind of unofficial status in the British wire trade, but the Imperial Standard Wire Gauge is the official standard. Nevertheless, many overseas merchants seem resolved to let the Birmingham Wire Gauge pass away in peace; its death is long overdue and will not be lamented by the trade.

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Compulsory Cartel in the German Wire Working Industry

THE German Ministry of Economy, on the basis of authority granted by recent enacted German legislation concerning the formation of compulsory cartels, has ordered that certain manufacturers of wire, wire nails, and spring wire made from ingot rolled iron associate themselves with the already existing syndicates for the sale of these articles. The Government's decree provides that all manufacturers who on Nov. 24, 1932, were members of the Wire Syndicate of Sept. 30, 1930, but who had withdrawn from this syndicate must renew their membership, while all other producers—those not members of the Wire Syndicate as of Nov. 24, 1932,—must associate themselves with the Vereiningung der freien Drahtwerke und Drahtstiftefabrikanten e. v., Ludenscheid, (Association of Independent Wire Working Concerns and Wire Nail Manufacturers).

THE ministry of Economy reserves the right of regulating and directing the two above mentioned syndicates and has the right to veto their decision and can also prevent the establishment of new concerns for the manufacture of wire products, the Ministry's decisions to be enforced by court action. The new organization is to run until Sept. 30, 1934, unless other decisions be made in the meantime. The two syndicates have just published their revised price lists which show decreases of about RM 0.75 per 100 kilograms, but the new stipulations provide for surcharges to be placed on small purchases and give the factories considerable latitude in refusing to accept orders for small quantities.

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Steel Activities in the Birmingham, England, District Improves

CONTINUED improvements in the Industrial situation of the English West Midlands district has been shown by a further decline in the extent of local unemployment during October. Increased absorption of labor has been spread over a wide range of industries, and there has been a freer movement of goods for stock replacement and for immediate use, while Autumn and Winter demands have been fairly satisfactory and exports have been well sustained. There has been a greatly improved home demand for locally manufactured iron and steel during the past few weeks, largely on account of increased activity in the basic consuming industries the hardening of prices, and the cumulative effect of the tariffs. In some instances, notably in respect to strips, bars, billets and sheets, productive capacity for immediate requirements has been exceeded and the output at one important steel plant is said to have increased 30 percent over that of a year ago.

A Review of Recent Wire Patents

No. 1,933,660, WRAPPED BUNDLE OF COILED WIRE, Patented November 7, 1933, by Clayton E. Dale, Crawfordsville, Ind., assignor to Mid-States Steel & Wire Co., Crawfordsville, Ind., a corporation of Indiana.

The wrapping for this coiled wire bundle is composed of paper and so wrapped that it may be easily removed and as a unit and special provision is made so that the wire may be drawn off at the proper end.

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No. 1,933,661, WRAPPING BUNDLE OR COIL OF WIRE AND LIKE ARTICLES, Patented November 7, 1933, by Clayton E. Dale, Crawfordsville, Ind., assingor to Mid-States Steel & Wire Co., Crawfordsville, Ind., a corporation of Indiana.

A rip wire is provided, formed independently of the bundle of coiled wire, the rip wire being anchored to the bundle to prevent slipping during ripping of the paper wrapper.

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No. 1,933,737, HELICAL CROSS METHOD OF MAKING SCREWS AND BOLTS, Patented November 7, 1933, by Charles Kaufman, Cleveland, Ohio, assignor to Pittsburgh Screw and Bolt Corporation, Pittsburgh, Pa., a corporation of Pennsylvania.

This method is particularly adapted to the reduction of liability of fracture in the grain line forming the head of the screws and bolts and is described as an improvement upon the inventor's prior U. S. Patent 1,617,122.

✦ ✦ ✦

No. 1, 933,914, HELICAL CROSS TIE, Patented November 7, 1933, by Hugh Leal, Windsor, Ontario, Canada, assignor to L. A. Young Spring & Wire Corporation, Detroit, Michigan.

This wire cross tie is particularly adapted for use in wire spring structures. The ends of the cross tie provide circular hooks with inwardly offset shank portions, the bills of the hooks lying in spaced overlapping relation to the inwardly offset shank portions and lying within the diameter of the adjacent coils which coils constitute guards therefor.

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No. 1,934,122, APPARATUS FOR TWISTING WIRE, Patented November 7, 1933, by Charles K. Hill Cleveland, Ohio.

The apparatus is particularly adapted for nail making machines for producing drive screws of twisted wire. The drive is positive instead of frictional and the wire is continuously twisted in long lengths.

✦ ✦ ✦

No. 1,934,153, SPRING ASSEMBLY FOR UPHOLSTERY AND MATTRESSES, Patented November 7, 1933, by Louis A. Suekoff, Wilmette, Ill., assignor to Nachman Spring-Filled Corporation, Chicago, Illinois, a corporation of Illinois.

This spring assembly is of untied springs, the loose ends being utilized as supports to the padwalls.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 17 East 42nd St., New York.

No. 1,934,466, COMBINED WIRE DRAWING AND FABRICATING MACHINE, Patented November 7, 1933, by Henry J. Hogue, Lakewood, Ohio, assignor of one-third to Charles L. Wasmer and one-third to John C. Wasmer, both of Lakewood, Ohio.

The machine is particularly adapted for screw and bolt making from hot-roll stock instead of from cold-drawn stock.

✦ ✦ ✦

No. 1,934,568, SCREW HOLDING DEVICE, Patented November 7, 1933, by Per Leonard Stenman, Stockholm, Sweden, assignor to Aktiebolaget Traskruv, Stockholm, Sweden, a corporation.

The device is operated through magnetic force, the wire blanks being held in the correct position relative to the operating jaws of the device.

✦ ✦ ✦

No. 1,934,643, WIRE CLOTH AND METHOD OF PRODUCING THE SAME, Patented November 7, 1933, by Harold Robert Rafton, Andover, Mass., assignor to Rafton Engineering Corporation, a corporation of Massachusetts.

This wire screen is particularly adapted for sifting purposes where very fine openings are required. The screen is constructed by taking ordinary wire cloth and coating the wires with metal thus reducing the size of the openings. This coating is preferably done by electro-deposition.

✦ ✦ ✦

No. 1,935,048, CONTINUOUS WIRE MILL, Patented November 14, 1933, by Josef Gassen, Dusseldorf, Germany, assignor to Schloemann Aktiengesellschaft, Dusseldorf, Germany, a corporation of Germany.

The construction includes a number of successively disposed groups of primary and intermediate housings designed to deliver more than two pre-rolled bars, as well as more than two groups of finishing housings disposed parallel with each other, each of these last named groups being arranged to receive from the first but one bar for final rolling. The arrangement is such that speed of the wire as it leaves the finishing roll is not increased but rather decreased and is maintained within such limits as to insure a practical control of each single speed.

✦ ✦ ✦

No. 1,935,092, APPARATUS FOR COILING MATERIAL, Patented November 14, 1933, by Lorenz Iversen, Pittsburgh, Robert E. Noble, Crafton and Gustaf L. Fisk, Pittsburgh, Pa., assignors to Mesta Machine Company, Pittsburgh, Pa., a corporation of Pennsylvania.

This apparatus is designed particularly to coil springs of metal into helic formation, the tightness and looseness of the coils being controlled by the apparatus. The construction includes a mandrel carrying a driven bending roller with a swinging guide carrying a driven bending roller, the guide adapted to swing outwardly as the diameter of the coil increases.

✦ ✦ ✦

No. 1,935,322, LEAD COVERED CABLE, Patented November 14, 1933, by Archie R. Kemp, Westwood, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York.

This cable is particularly adapted for underground use and is provided with a jacket to protect the lead cover, the jacket being composed of braided asbestos covered wire impregnated with a stearin pitch fire-and-water-proofing.

✦ ✦ ✦

No. 1,935,323, UNDERGROUND CABLE, Patented November 14, 1933, by Archie R. Kemp, Westwood, and John H. Ingmanson, Glen Ridge, N. J., assignors to Bell Telephone Laboratories, Incorporated, New York, New York, a corporation of New York.

This underground cable is provided with a jacket which is made up substantially of ten to forty per cent vegetable pitch, ten to fifteen per cent blown asphalt, thirty per cent to forty-five per cent ground vulcanized rubber, about ten per cent of ground silica and ten per cent to thirty per cent of material selected from the group, gilsonite and asbestos fibers.

✦ ✦ ✦

No. 1,935,726, VARIABLE WIRE TENSIONING DEVICE, Patented November 21, 1933, by William D. Pierson, Waterbury, Conn., assignor to The Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., a corporation of Connecticut

This device is intended to be positioned between the last die in a wire drawing machine and a wire spooler. Adjustment of the wire tension is obtained by varying the amount of contact of the wire around the final drawing roll.

✦ ✦ ✦

No. 1,935,821, WIRE DRAWING DIE, Patented November 21, 1933, by Morris Simons, New York, N. Y.

The die is provided with annular nib of tungsten carbide, but the passage through the center is not finished to the exact diameter required for the size of wire to be drawn, the wall of the passage being left rough. It is claimed this construction resists outward disruptive forces.

✦ ✦ ✦

No. 1,935,995, APPARATUS FOR CLEANING AND COATING WIRE FABRIC, Patented November 21, 1933, by George A. Roemer, Kokomo, Indiana, assignor to Continental Steel Corporation, Kokomo, Ind., a corporation of Indiana.

This apparatus is adapted for continuously cleaning and zinc coating wire fabrics.

Manufacture of Non-Ferrous Seamless Tubes

(*Continued from page 20*)

to what extent material under treatment for the production of tubes may be punished, or, in other words, the ratio of the pierced to the extruded shell.

✦ ✦ ✦

THE author reiterates his opinion that in a modern factory, both the rotary piercer and the extruding press are essential, the former, when suitable material is provided, being necessary for large diameters, and the latter with its wider range in alloys for the smaller diameters. The rotary mill, with its great flexibility capable of dealing with sizes from 20 in. down to 2 in., has in some cases been duplicated with a reduction of peripheral speeds and decrease in power consumption when applied to billets of the smaller diameter. There is little economy in applying a mill with a capacity of 20 in. to billets of 4 in. and under. The outstanding costly factor in tubes of cold-drawn finish is the cold-drawing process, with its attendant pickling and annealing between each pass, but there are signs that in the near future the whole combined process will be reduced to a minimum, in fact to require just sufficient drawing to enable the material to comply with the mechanical or physical tests of standard specifications.

✦ ✦ ✦

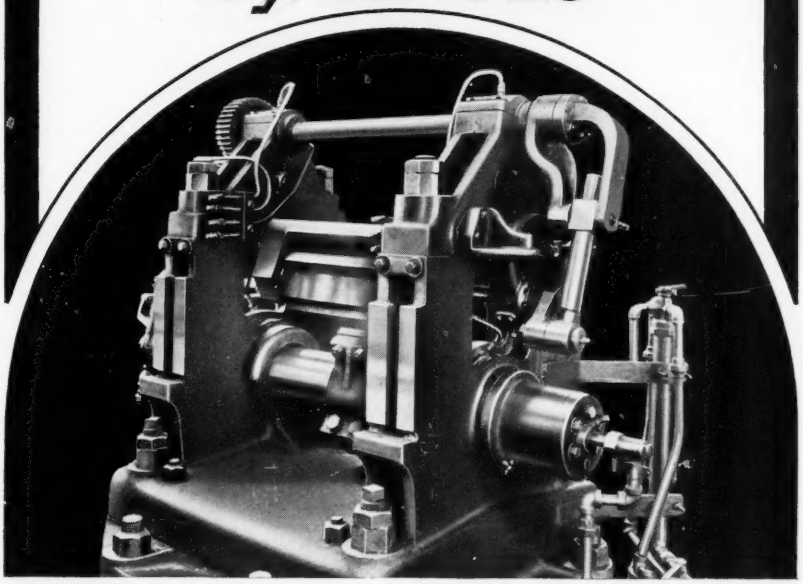
Seams For Fourdrinier Wires

(*Continued from page 16*)

seam according to photo 9 the weft wire is not concerned by the soldering or welding of the intertwisted or bound warp wire ends. The soldered joints of the warp wires have to transfer no tensile strains, but they have only the task to resist to an untwisting or untwining of the wires. Therefore, at this special seam, the solidity and strength of the seam is by no means prejudiced by the described

(*Please turn to page 27*)

FLYING SHEAR *by LEWIS*



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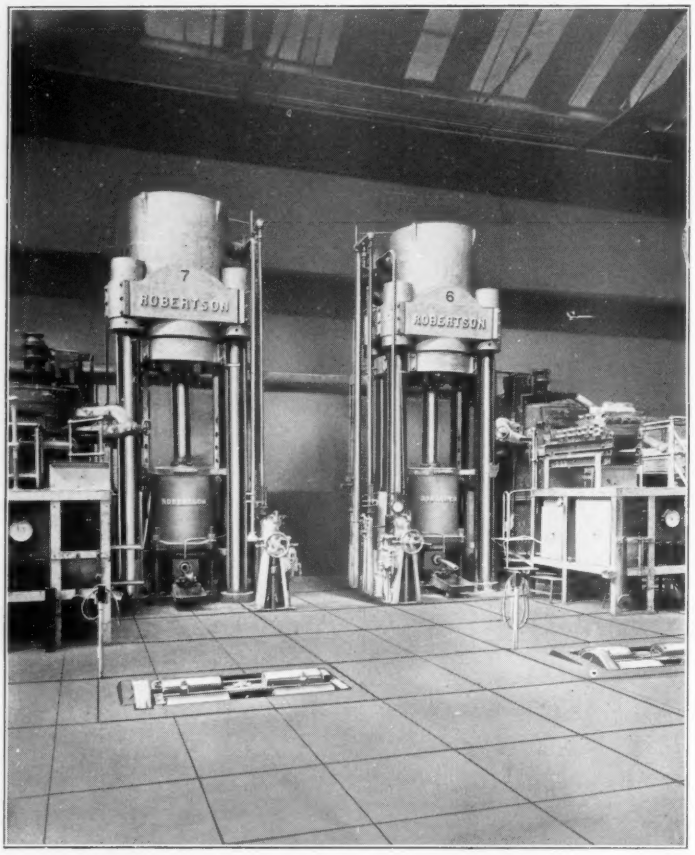

Robertson Equipment

Predominates in Northern Electric Company's Montreal Plant

Above is a partial view of the Lead Press Room at the Northern Electric Company's Montreal Plant. The illustration shows two 2500 ton Robertson Cable Encasing Presses. Each press is supplied by a 20,000 lb. capacity Robertson Lead Melting Pot, equipped with Motor Driven Lead Delivery Pumps.

It is a significant fact that Robertson Presses and allied Extrusion Equipment are practically "STANDARD" with the Northern Electric Company (and many other Cable and Hose Manufacturers).

Remember—there's three quarters of a Century's Experience behind Robertson Products.

Robertson Products Include:

Lead Encasing Presses for Cable and Rubber Hose,—Extrusion Presses for Non-ferrous Metals, — Lead Strippers, Melting Furnaces, Pots, Dies, etc.—and, of course, the well known Robertson Hydro-Pneumatic Accumulator and High Pressure Hydraulic Pump.

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John ROBERTSON CO. INC. — *Pioneers-Since 1858*

125-137 Water Street Brooklyn, N. Y.

Exports and Imports

(*Continued from page 21*)

of 9,361 tons. Belgium, the fourth supplier, offered the most diversified contribution in her total of 6,910 tons including 2,843 tons of structural shapes, 1,492 tons of merchant bars, and 1,354 tons of hoops and bands. Of the Swedish total of 2,459 tons 1,370 tons was wire rods.

✦ ✦ ✦

CARD clothing receipts more than doubled, reaching 38,744 square feet valued at $52,518. Of this quantity 30,999 square feet ($37,735) came from the United Kingdom, 4,443 square feet ($6,535) from Germany, 3,226 square feet ($7,893) from France, and the balance from Switzerland.

✦ ✦ ✦

WIRE cloth and screening imports were also greater in October—the 36,777 square feet imported (50 per cent more than in September) including 23,153 square feet from Canada, 7,485 square feet from France, and 6,-139 square feet from Germany.

✦ ✦ ✦

THE trade in fourdrinier and other paper making wire registered a smart gain—totalling 68,162 square feet and received from Austria (51,618 square feet), Sweden (10,182 square feet), France (4,050 square feet), and from Germany (2,312 square feet).

✦ ✦ ✦

THE trade in wire fencing and netting was smaller in October. Of that galvanized before weaving 2,442,125 square feet were received—this quantity including shipments of 1,856,050 square feet from the Netherlands, 482,325 square feet from Germany, 96,250 square feet including 2,516,-000 square feet had from Germany, 1,357,500 square feet which arrived from Belgium and 901,474 square feet accredited to the Netherlands.

WHY DON'T YOU JOIN THE WIRE ASSOCIATION: ADDRESS THE SECRETARY

Richard E. Brown, 17 East 42nd St., New York, N. Y.

Seams For Fourdrinier Wires

(*Continued from page 25*)

manner of holding the last weft wires by the embracing warp wires. So, such seams satisfy the heavy strain to which they are subjected during their run on the paper machine.

✦ ✦ ✦

PHOTO 9 shows a front view of two cloth ends joined by means of this special seam. Numbers 1-5 indicate that weft wires; the warp wires are designated by numbers 6 and 7. The ends of each warp wire pair 6, 7 are joined by intertwisting and soldering them together before the last weft wire 1 which they embrace. The join of the seam is formed by the last weft wires 1 and a closing wire 8 wound round them.

(*Continued in February*)

✦ ✦ ✦

New Panning Machine And Talc Spreader

AMONG the recent developments in wire mill machinery of interest to the insulated wire and cable industry, should be noted a panning machine and motor driven automatic talc spreader which has been developed by the American Insulating Machinery Co., at Philadelphia, Pa.

✦ ✦ ✦

THE manufacturer states that this panning machine accomplishes the following things:

Maintenance of maximum capacity of tubing machine.

Uniformity of quality.

Uniformity of rubber wall, both as to outside diameter and amount of rubber used.

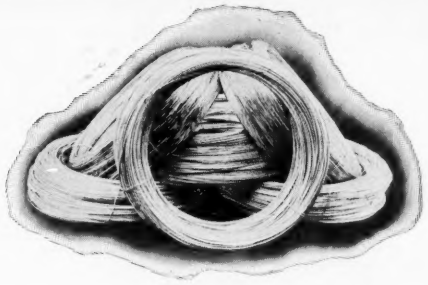
Automatic panning of wire, with consequent saving of wages.

✦ ✦ ✦

THIS panning machine is a compact, self contained unit of improved design requiring much less floor space and eliminating cost of mounting variable speed countershafts on floor or ceiling. It has a positive drive to the revolving table in place of a friction drive and is designed to permit removal of pans by a lift truck or trolley hoist.

(*Please turn to page 28*)

SILVER BRIGHT GALVANIZED



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✦ ✦ ✦

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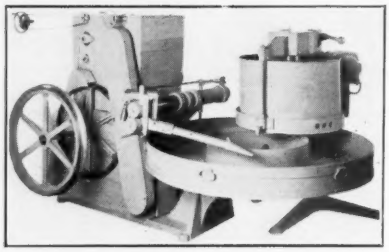
IMPROVED MODEL of the
Aimco Panning Machine with Variable Speed Countershafts and Capstan self-contained on one bed-plate (Ball Bearings throughout) shown with the
AIMCO Motor Driven Automatic Talc Spreader
(Patents pending)
For panning rubber covered wire before vulcanization.
Send for descriptive circular.



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THE BISSETT STEEL COMPANY
CLEVELAND
PITTSBURGH BUFFALO CINCINNATI

New Type Panning Machine

(*Continued from page 27*)

THE machine will handle rubber covered wire of one inch and smaller outside diameter. Pans of 60 inches outside diameter, 16 inches minimum inside diameter, and 6 inches maximum depth can be accommodated by the machine. Larger cable and larger size pans can be taken care of by a special machine.

✦ ✦ ✦

THE talc spreader which is designed for use not only with this particular machine but for use with all previous models of panning machines produced by iths company, automatically spreads talc in layers of the same depth uniformly distributed and at precisely the time when needed. The thickness of the layer of talc is readily adjustable by hand-operated shutters while the machine is in operation, the amount of talc deposited in the pan being determined by the position of the main shutter-valve, the auxiliary high-speed shutter being kept closed. Should rate of production of wire necessitate the panning machine being operated at a speed at which centrifugal force tends to displace the talc in the pan, compensation is accomplished by opening the auxiliary (high-speed shutter) the necessary amount, and closing the main shutter an equal amount.

✦ ✦ ✦

THE minimum amount of talc needed can be deposited, thereby leaving the maximum amount of space in the pan available for wire.

✦ ✦ ✦

THE talc spreader accommodates pans of the same dimensions as the panning machine.

✦ ✦ ✦

THE panning machine is designed to be used with the automatic talc spreader, but it can be used without it by applying each layer of talc manually at the proper time and in the proper amount.

✦ ✦ ✦

FULL information can be obtained by writing for Bulletin 79-D to the American Insulating Machinery Co., 517 W. Huntingdon Street, Philadelphia, Pa.

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IN THE HEART OF TIMES SQUARE

Kelly Wire Die Corp. Moves to Larger Quarters

DUE to a considerably enlarged volume of business which gives promise of continued expansion, the Kelly Wire Die Co. announce that they have taken new and larger quarters at 256 W. 31st St., New York, N. Y.

This company is engaged in the manufacture of Tantalum, Tungsten and Diamond wire, rod and tube drawing dies and is the Eastern agency for the Vascoloy-Ramet Corp.

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WIRE DIE CORPORATION
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BUYERS' GUIDE

For more complete information, consult the annual Directory, Index & Buyers' Guide.

ANNEALING FURNACES
See Furnaces—Various Headings

ANNEALING POTS AND BOXES
Scudder, E. J., Fdry & Machine Co., Trenton, N. J.

ARMORING EQUIPMENT
Amer. Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

BAKERS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CASTINGS—Wire Mill
E. J. Scudder Foundry & Machine Co., Trenton, N. J.

CHEMICALS—Cleaning
American Chemical Paint Co., Ambler, Pa.

CLEANING & PICKLING EQUIPMENT
Broden Construction Co., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

COATING—Protective
American Landolin Co., Lawrence, Mass.

COILERS—Sheet and Wire
H. J. Ruesch Machine Co., Newark, N. J.

CRANES—Wire Mill
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

DIES—Diamond
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Cochaud Wire Die Co., New York.
Driver-Harris Co., Harrison, N. J.
Vianney Wire Die Works, New York.

DIES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Cochaud Wire Die Corp., New York.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Vianney Wire Die Wks., N. Y.

DIES—Rod and Tube Drawing
Bissett Steel Co., Cleveland, O.
Carboloy Co., Inc., Newark, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Tantalum Carbide
Bissett Steel Co., Cleveland, O.
Kelly Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Tungsten Carbide
Bissett Steel Co., Cleveland, O.
Carboloy Co. Inc., Newark, N. J.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DRAW BENCHES
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

ENGINEER—Consulting Wire Mill
Jagielski, Otto, Yonkers, N. Y.
Lewis, Kenneth B., New York, N. Y.

EYELETS—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FURNACES—Annealing
Electric Furnace Co., Salem, O.

FURNACES—Automatic
Electric Furnace Co., Salem, O.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, O.

FURNACES—Electric
Electric Furnace Co., Salem, O.

FURNACES—Lead Melting
Electric Furnace Co., Salem, O.
John Robertson Co., Brooklyn, N. Y.

FURNACES—Non-Oxidizing
Electric Furnace Co., Salem, O.

FURNACES—Wire
Electric Furnace Co., Salem, O.

GALVANIZING ENGINEER
W. H. Spowers, Jr., New York, N. Y.

INHIBITORS
American Chemical Paint Co., Ambler, Pa.
Grasseli Chemical Co., Cleveland, O.
Wm. M. Parkin & Co., Pittsburgh, Pa.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LIME—Pulverized
Amer. Lime & Stone Co., Bellefonte, Pa.

LUBRICANTS—Wire Drawing
Drakefield, B. F., & Co., New York, N. Y.
R. H. Miller Co., Homer, N. Y.
Robertson, J. T., Inc., Syracuse, N. Y.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
John Robertson Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
New England Butt. Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Bunching
Amer. Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Machinery Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Company, Paterson, N. J.

MACHINERY—Chain Making
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Coilers
Broden Const. Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

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MACHINERY—Copper Wire Drawing and Rolling
H. J. Ruesch Machine Co., Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cutting
Broden Construction Co., Cleveland, O.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Worcester, Mass.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Extruding
John Robertson Co., Brooklyn, N. Y.
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Forming
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
H. J. Ruesch Machine Co., Newark, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Insulating
American Insulating Machinery Co., Phila.
New England Butt Co., Providence, R. I.
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lead Encasing Presses, ets.
John Robertson Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Measuring Wire & Cable
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Machinery Co., Phila.

MACHINERY—Pointing
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, O.
Morgan Const. Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Lewis F'dry & Machine Co., Pittsburgh, Pa.
United Eng. & Foundry Co., Pittsburgh, Pa.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, O.
Lewis F'dry & Machine Co., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Rubber Strip Covering
Farrel-Birmingham Co., Ansonia, Conn.
New England Butt Co., Providence, R. I.
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
John Royle & Sons, Paterson, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila. Pa.
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry and Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Machinery Co., Phila.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Const. Co., Cleveland, O.
Lewis F'dry & Machine Co., Pittsburgh, Pa.
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Swaging
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Worcester, Mass.

MACHINERY—Taping
Amer. Insulating Mach. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Tinsel Rolling Mills
Amer. Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Welding Wire
F. B. Shuster Co., New Haven, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Insulating Machinery Co., Phila.
Broden Const. Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Company, Paterson, N. J.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Grasselli Chemical Co., Cleveland, O.
Wm. M. Parkin & Co., Pittsburgh, Pa.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.

POTS—Lead Melting
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead Encasing
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

PULLERS—Wire
E. J. Scudder Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
John Robertson Co., Brooklyn, N. Y.

REELS AND SPOOLS—All Kinds
Avoca Mfg. Co., Avoca, N. Y.
R. B. Hayward Co., Chicago, Ill.

REEL AND TENSION STAND—
Sleeper & Hartley, Inc., Worcester, Mass.

REEL CRUTCHES
R. B. Hayward Co., Chicago, Ill.
Watson Machine Co., Paterson, N. J.

ROLLING MILLS—See Machinery—Rolling Mill

ROLLS—
Lewis F'dry & Machine Co., Pittsburgh, Pa.
United Eng. & Fdry. Co., Pittsburgh, Pa.

RUST PROOF COMPOUND
American Lanolin Co., Lawrence, Mass.

SOAPS—Wire Drawing
Drakenfeld & Co., B. F., New York, N. Y.
R. H. Miller Co., Homer, N. Y.
Robertson Co., J. T., Inc., Syracuse, N. Y.

STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TRUCKS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS
H. J. Ruesch Machine Co., Newark, N. J.

VULCANIZERS
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS
American Insulating Mach'y Co., Phila., Pa.

WIRE—Enameled For Coils
Winsted Insulated Wire Co., Winsted, Conn.

WIRE—Manufacturers
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Non Ferrous to Specification
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.
Winsted Insulated Wire Co., Winsted, Conn.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Keystone Steel & Wire Co., Peoria, Ill.

WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

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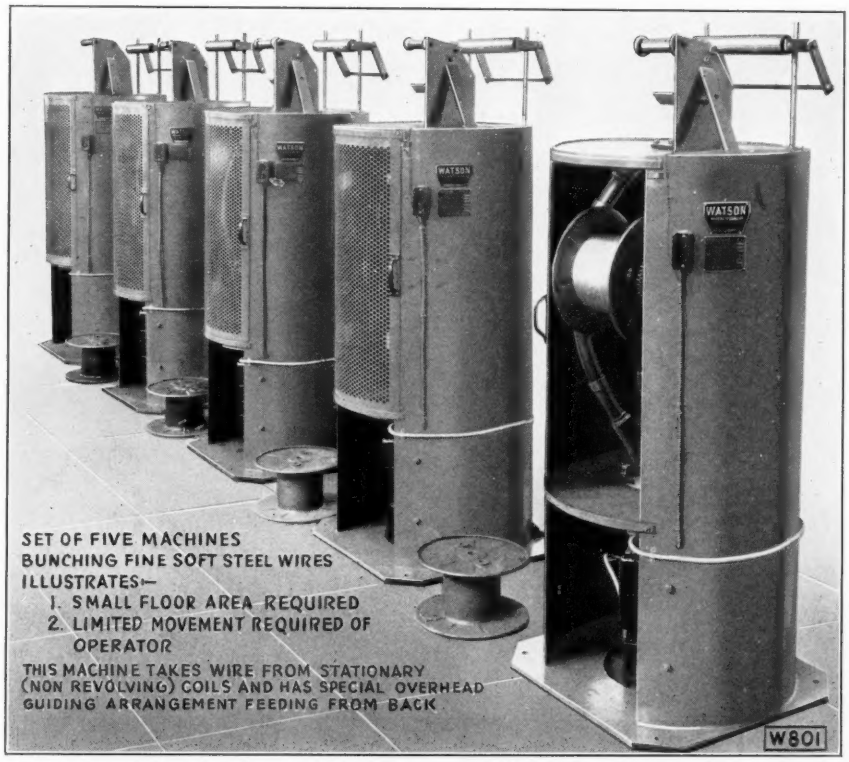
ESTABLISHED 1845

Paterson, New Jersey, U. S. A.

Engineers . Founders - Machinists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WATSON
WATSON
SET OF FIVE MACHINES
BUNCHING FINE SOFT STEEL WIRES
ILLUSTRATES—
1. SMALL FLOOR AREA REQUIRED
2. LIMITED MOVEMENT REQUIRED OF OPERATOR
THIS MACHINE TAKES WIRE FROM STATIONARY (NON REVOLVING) COILS AND HAS SPECIAL OVERHEAD GUIDING ARRANGEMENT FEEDING FROM BACK
W801

A modern high capacity installation of five WATSON BUNCHERS V7 for fine wire bunching, for single operator is shown above.

At 1″ lay 42,000 feet of strand is produced hourly.

Small floor area, and automatic electric stops enable single operator to take care of eight machines with ease.

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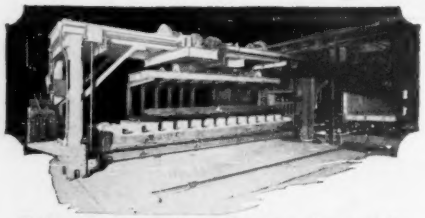
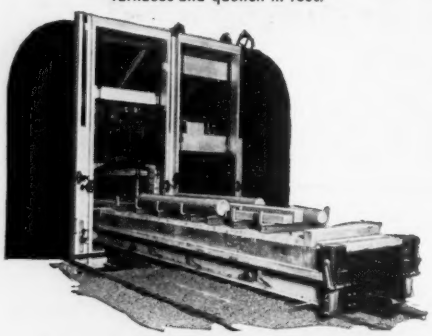
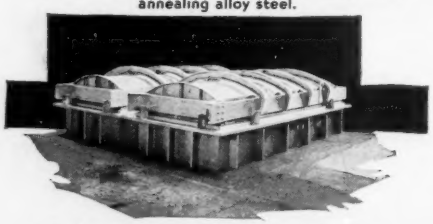


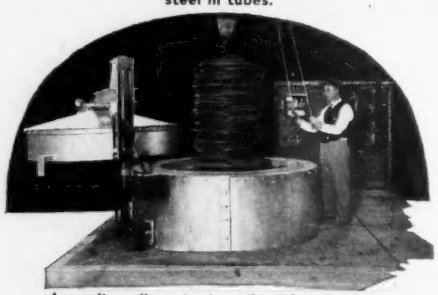
Fully motor operated crane handling alloy steel for furnaces and quench in rest.



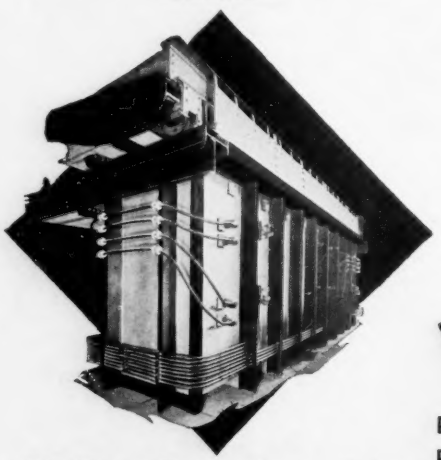
Two more car type furnaces for normalizing and annealing alloy steel.



Rectangular pit type furnace annealing alloy steel in tubes.



Annealing alloy wire in coils without scale or decarburization.



Spheroidize annealing alloy rods up to 27 ft. long.

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IN ANY SIZE, SHAPE OR QUANTITY

To positively duplicate established time-temperature cycles---and to provide the high degree of accuracy necessary in treating alloy steel are but two functions of the numerous installations we have made in prominent alloy steel plants throughout the country---a few are shown at left.

The ability to design and build successful heating and material handling equipment, so arranged as to produce the desired results with the minimum of labor and expense, is the result of wide experience and the careful attention given, to each customer's particular needs.

Printed matter showing these and other types of furnaces for treating alloy steel and various other products gladly sent on request.

Put your heat treating problems up to our EXPERIENCED engineers. We will design and build equipment to fit your particular requirements.

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Electric and Fuel Fired Furnaces.

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